ARCHIVES OF OTOLOGY.

TWO CASES OF ADENOMA OF THE SEBACEOUS GLANDS OF THE EXTERNAL EAR.

By Dr. C. KLINGEL, Berlin.

Translated by Dr. Ward A. Holden, New York.

(With Plates I. and II. of vol. xxi., German Edition.)

TWO cases of adenoma of the sebaceous glands of the external ear have recently been observed in Dr. Hartmann's aural clinic, and were examined microscopically.

Case 1.—Mrs. P., æt. thirty-six, came to the clinic complaining of a growth in the external auditory canal. It had been noticed three months before, had never caused pain, and had not injured the hearing. The patient complained only of a feeling as if the ear were plugged with cotton.

On the anterior wall of the auditory canal quite externally, sat a tumor somewhat larger than a pea (Fig. 1, Plates I and II).

The tumor was soft to the touch, covered with epidermis having isolated small hairs, and in which the orifices of sebaceous glands could be seen with the naked eye.

It was removed at once with the galvano-cautery loop. In the course of the after-treatment it was once necessary to cauterize the base of the tumor with nitrate of silver.

The extirpated tumor was washed in water, placed then in alcohol and ether *aa* for twenty-four hours, imbedded in celloidin and cut. The sections were stained with carmine.

Case 2.—Mr. P., æt. forty-five, came to the clinic with a tumor of the same size and appearance as that in Case 1, but located on the anterior surface of the auricle, at its inner portion, where it passes over into the posterior wall of the auditory canal. The patient was unaware of the presence of the tumor which had caused no symptoms.

This tumor was removed partly with the cautery loop, partly with the knife. The extirpated piece was hardened and cut as in the preceding case.

Both tumors were of equal size. Each was about as large as a pea, soft and sponge-like to the touch, the surface slightly roughened, and showing a few scattered hairs.

Microscopically the structure was similar in the two, and the description which follows refers, for the most part, to the tumor of Case 1, since that of Case 2 could be removed only in pieces.

The ground substance of the tumor is a delicate loose connective-tissue. The intercellular substance shows fine shining fibres running in parallel tracts with a slightly wavy course, the tracts interlacing in various directions. Among these fibres lie the connective-tissue cells, in places isolated, at other points grouped. The cells are mostly spindle-shaped, the protoplasm scarcely visible, the nucleus stained darkly. The nuclei are relatively large, and for the most part contain several nucleoli imbedded in a finely granular substance. Between the tracts of fibres are isolated cavities, which, however, are not lined by endothelium.

The vessels are few and mostly small, and rarely show a wall consisting of many layers of cells. Usually there is merely an endothelial sheath, the cells of which are here and there in process of proliferation, causing the wall to appear thicker. This proliferation, however, never reaches such a stage that the lumen of the vessel becomes occluded. The proliferated cells seem often to have undergone a hyaline degeneration, so that the contents of the vessel consist of a clear vitreous mass, in which nuclei can still be perceived with difficulty—relations such as are pictured in Figs. 3 and 4.

Toward the periphery of the tumor the connective-tissue cells lie crowded together in close groups (Fig. 5). The cells themselves are rounder and larger, and have large nuclei which stain well with carmine and contain several nucleoli. Traces of karyokinetic figures are occasionally seen. Between these groups of cells just described run narrow connective-tissue tracts with parallel fibres, containing fine spindle cells and isolated small vessels. The cell-groups, most marked in the periphery of the tumor, grow smaller and further apart, and the cells fewer toward the

central portion, where the connective-tissue predominates. I hold these groups of cells to be evidences of growth which here, as in other structures, is localized to the periphery of the tumor.

The external covering of the tumor consists of a thin layer of epidermis. The lower layer is formed of cylindrical cells, above this the cells are rounder, and nearer the surface is a layer of flattened cells covered with a delicate horny layer; the epithelium is otherwise not remarkable.

The hairs spring from follicles sunk deep in the tissue, which contain great masses of epithelial cells, separated from the neighboring cellular tissue by a fine layer of connective-tissue with parallel fibres. The latter undoubtedly corresponds to the usual fibrous sheath of the hair follicle. Muscular fibres, which might be arrectores pili, were not found.

Near the hair follicles, sebaceous glands were found which excite interest on account of their excessive development. These are partly in connection with the hair follicles, partly distinct from them. In one section (Fig. 2) which passed through the middle of the tumor, perhaps not quite parallel to the surface, large glands are seen deep in the tissue in such large groups that it can well be considered a new formation. The individual glands are composed of several lobules. The new formed glandular tissue has the character of normal sebaceous glands, being only more excessively developed.

Each lobe of a gland is surrounded with a connective-tissue sheath, which is continued about the smaller lobules also. This connective-tissue layer lies for the most part adherent to the proper gland tissue, but here and there cavities exist between them. The glandular substance consists of large epithelial cells, the exterior ones well preserved, staining with carmine, and having a sharply contoured nucleus with a number of nucleoli. The layer of normal cells is, however, very thin, and further inward the aspect of the cells changes. They appear larger as if swollen, do not stain so clearly, and the contours as well as the nuclei are less sharply defined. The interior portion appears often as

if it had undergone fatty degeneration, and is changed into a structureless mass. The same processes take place here as in normal sebaceous glands, in that the interior epithelial cells, which are cast off, swell, undergo fatty degeneration, and form a detritus which is excreted as sebaceous matter on the skin.

Convoluted glands, such as might have been expected from the location of the growth in the external canal, were not found.

To recapitulate, the sections showed *connective-tissue tumors covered with epidermis, in which there is seen a marked new formation of glandular elements, similar in character to normal glands.*

As far as I know, Gruber is the only one that has described such formations, and he classes them with the papillomata (Text-book of Otology, Vienna, 1888). He also describes the "markedly hypertrophie or even cystic follicle, whose contents are found at times to be chalky"; and he has repeatedly observed the transformation of these papillomata into epithelial carcinomata.

In my opinion, these tumors which I have described should not be classed as papillomata, although the warty exterior, and the fact that they arise from the subepithelial connective-tissue of the skin of the auricle would suggest this view. We have, however, not only a warty hypertrophy of the papillæ, but also a marked new formation of glandular elements. I would, therefore, call these structures adenomata of the sebaceous glands (adenoma sebaceum), and since connective tissue is not an unimportant element of the tumors, adenoma sebaceum fibrosum.

Explanation of the Figures.

Fig. 1. A drawing of the tumor in Case 1, as it first presented itself.

Fig. 2. Section through the middle of the tumor (slightly magnified).

Figs. 3 and 4. The proliferations of the vascular endothelium which have undergone hyaline degeneration.

Fig. 5. Cell-groups in the periphery of the tumor.

Fig. 6. Hypertrophie sebaceous glands.

Fig. 2.

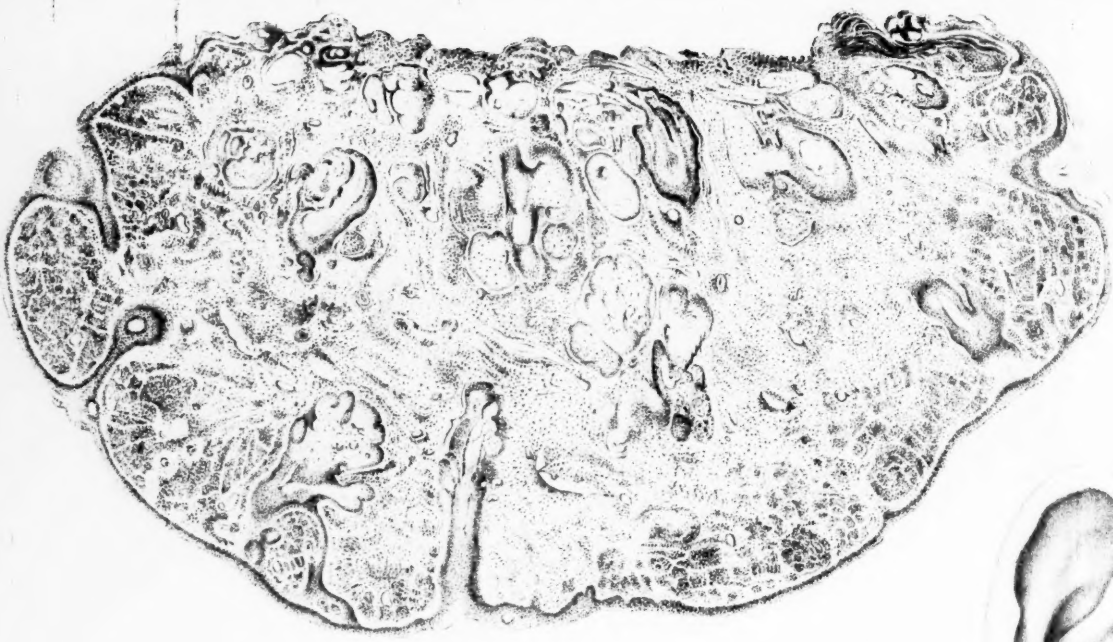


Fig 1.

Fig. 3.

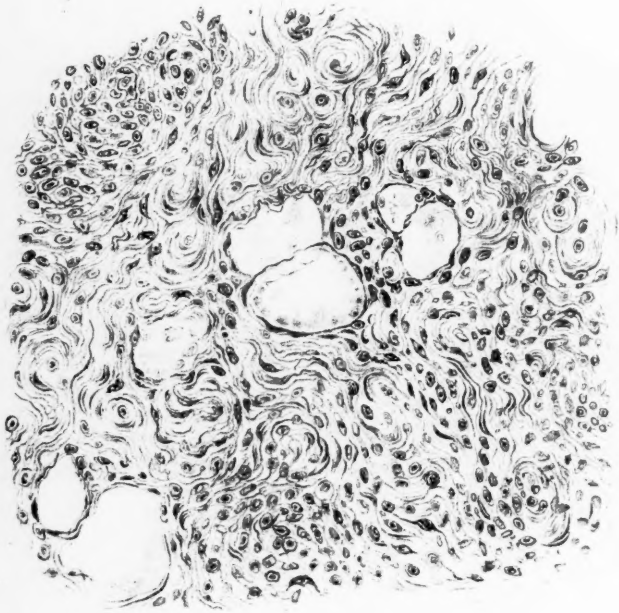
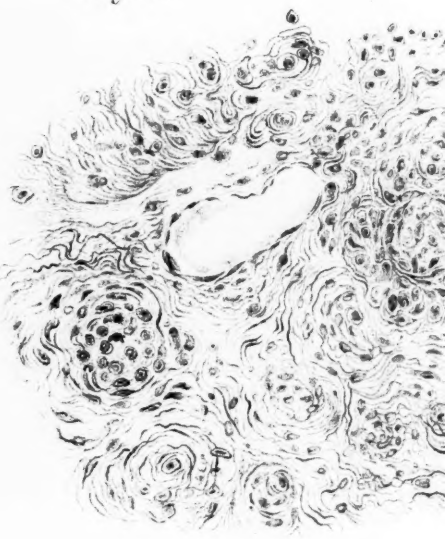


Fig. 4.



Lith. Anst. v F. Wirtz, Darmstadt.

Fig. 5.

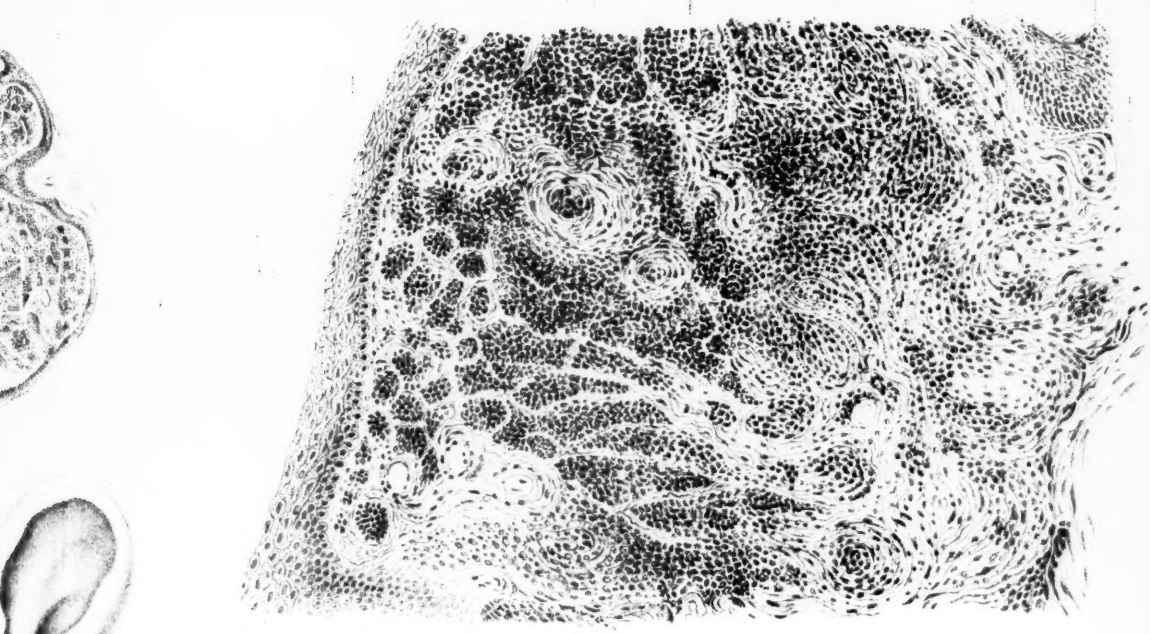


Fig. 6.

Verlag v. J. F. Bergmann, Wiesbaden

VESICLES IN THE EXTERNAL AUDITORY MEATUS.[1]

By H. L. SWAIN, M.D.,

LECTURER ON DISEASES OF THE EAR AND THROAT, YALE UNIVERSITY.

IT will be generally conceded that the occurrence of vesicles in the external ear and upon the membrana tympani is rare. They present themselves in two varieties; the one with clear, colorless serum, the other where the contents are more or less distinctly red—*i.e.*, bloody, both kinds occurring in the same case in some instances. To the latter variety a specific name is sometimes given and a few writers have considered it as a special disease, terming it Otitis externa hæmorrhagica. Under this title Gorham Bacon[2] writes that in 2,500 cases of ear disease he met this disease only five times. He quotes quite at length from the very little literature which is available on the subject and his conclusions from his own experience tally very closely with those of the authors quoted.

Anything as rare as the above in so large a clinical experience is always a matter of interest, and as my own observations did not discover but three cases of vesicles in almost as many patients (some 2,000 cases) seen up to December, 1889, I may be excused if I place at this time on record the short report of the five following cases which occurred during and subsequent to the pandemic of the grippe, 1889-1890, and all appeared within a few months in my own private practice. I am aware that my experience

[1] Read before the New Haven Medical Club.

[2] Otitis externa hæmorrhagica.—Archives of Otology, vol. xix., No. I.

has been duplicated by that of a number of other observers as recorded in several foreign journals, and intend this simple statement to be as a mite added to the more extensive records of others, the last case being of interest in its uniqueness. The only conclusion that is drawn is that which is self-evident, namely, that the grippe was responsible for this sudden appearance of so many cases in so short a time. A second thought which suggests itself is, whether there is not the same pathological condition necessary to the production of all the vesicles as existed in the case of the one occurring in connection with herpes and of those produced in the last case as part of that pathological curiosity, pemphigus.

Of the three cases which I saw previous to December, 1889, two were seen in Germany and were the only cases appearing in the clinics during the two years. The one appeared in the Policlinic, and the other in the private practice of Prof. Hagen in Leipzig. The third case came in my own practice one month previous to the appearance of the Grippe in New Haven. The first case appeared in the left ear of a boy of seven or eight years who was under treatment for chronic middle ear catarrh. It came in curious connection with a herpes at the angle of the mouth on the same side and a slight phlyctenular spot on left sclero-corneal margin of left eye, was simple serous in character, occupying the post. infer. quadrant of the drum, caused some pain, not a little deafness, both the latter being relieved by puncture, and got well in a few days with the throwing off of a large flake of epithelium from the drum. The second occurred at about the same time as the other and appeared in a young lady of about twenty summers, who was also under treatment for middle ear trouble. It was also upon the drum, and disappeared in a few days, having been of the colorless variety and causing no very intense symptoms. The third was some three or four years later—November, 1889. The young lady, twenty-one years old, came with a discharging right ear, which trouble had appeared after an earache of some thirty-six hours duration. The discharge was principally serum, and when wiped out disclosed a vesicle, covering

both posterior quadrants of the drum. The color was light red and on being punctured a drop of clear serum came out with a complete collapse of the vesicle. Politzer's experiment showed that no perforation of drum existed. Before puncture, Hearing Dist. for watch (normally heard at ten ft.) was fifteen inches: after puncture, eighteen inches. The case showed no discharge on re-appearing on the third day and the hearing steadily increased to normal, although during the following two weeks the drum was very concave. The middle ear was open to Valsalva's experiment during whole duration of the treatment, which was about a month.

The first of the five cases forming the subject of present report presented itself on the seventh of January, 1890.

The history is as follows:—Mr. P., age twenty-one, student at University, was attacked with the grippe eight days ago, which pursued a rather violent course, judging from fever and prostration suffered. Night before last was attacked with violent pain in right ear which, continuing almost steadily, was only slightly relieved by the appearance of discharge at ten last evening. The matter discharged was watery in appearance, having a slightly red tinge, and continues until present, filling the ear. The left ear was not painful although patient thought he heard less than usual. The drum on that side was thickened, concave and had a yellowish red cast. H D, R ear, three in.; L ear, sixteen ins. After wiping out the discharge in right ear, there was disclosed a hemorrhagic vesicle occupying the whole posterior part of drum, enough swelling of the superior part of drum having taken place to obscure proc. brevis of the malleus. The anterior half of drum was very much bulged and from a small perforation, invisible at this time, some serous matter oozed on Politzer's experiment being performed. A partial evacuation of vesicle was obtained, and patient was put upon usual treatment for acute otitis media, nothing but hot water being instilled into the ear. The next day a new vesicle had appeared, covering post. sup. quadrant and the membrana flaccida. This was punctured and only partially evacuated itself as was the case yesterday. H D, four in., R ear. Discharge thick and abundant, red in character. No pain. The same status was presented on the following day, with same result of puncture. On the fourth day a deep incision more anteriorly

than before into the vesicle was followed by a profuse discharge of blood for some ten minutes, and on its ceasing Politzer brought air through the membrana flaccida. After this the discharge in the ear grew rapidly less, and on the 21st the openings superiorly in membrana flaccida and in the anterior sup. quadrant had both closed. H D, R ear, six inches. No re-puncture of the drum was necessary and although the patient remained under observation until the 25th of April his H D for R ear was only twenty-three ins., and the L ear, twenty-eight in. The left drum was so much thickened by previous disease that one could not be expected to produce any improvement in hearing by further treatment.

In this case we evidently had to do with extravasation of blood into the attic of the tympanum as well as the occurrence of a bloody vesicle, and that explains our ineffectual attempts to get complete removal of the blood by puncture on the second and third day. The treatment included syringing, astringent drops, applications to naso-pharynx, which had been violently congested, the latter being not a little helped by frequent gargles with ejection through nostril.

CASE 2.—Mrs. P., widow, thirty-seven years, resident in city. Eight days ago attacked by the grippe. Three days ago pain and deafness in the right ear, culminating in breaking with discharge thirty-six hours ago. The matter flowed abundantly and patient reports that blowing the nose was followed by bubbling and much pain in the ear. Still pain and deafness were unrelieved. The left ear has been deaf since childhood, following scarlatina. Case presented itself January 24th.

STATUS PRÆSENS.—Right ear full of discharge, muco-purulent. Left ear clear, drum very much thickened, very concave, well-nigh rigid, presents chalk deposits in both ant. and post. halves. H D, watch. R-ear-contact; L not at all. On wiping out discharge in right ear we found a very red drum with a goodly opening in ant. inf. quad. Posteriorly a large hemorrhagic vesicle covering all the posterior half of drum and running slightly on to the adjacent wall of meatus. So very thin was the epithelial covering that the next move of the cotton-wad to dry it more thoroughly resulted in its complete collapse and the discharge of its bloody contents. Politzer's ex. revealed post. quadrant intact, and easily blew out discharge from middle ear. Hot water was ordered internally and externally. Spray of Seiler's

tablets for severe rhinitis, as also insufflation of boric acid, cathartic. The next day found patient with abundant discharge, no pain, perforation freely open, no new vesicles. H D, *id.* Two days later the watch could be heard, open, at 2½ in. The opening in drum healed kindly by the 3d of February following, syringing with simple antiseptic wash, and the rhinitis had almost disappeared. The hearing, however, was very obstinate, and patient presented herself for treatment very irregularly. On the 22d inst. H D R, 12 in. watch closed. Was but little better for some two months, according to patient's own statement, I not having examined ear later.

CASE 3.—Miss C., twenty-seven years. Teaching in the city Resident in a suburb. Has always had excellent hearing and had formerly been under my treatment for catarrh of the nose and throat. Two days ago severe cold with some prostration, which the patient objects to terming the grippe. The left ear soon began paining her, and this continued until last night, when something broke and almost clear blood came; later watery matter. Pain is better to-day, but patient is "some deaf" on that side. Case presented itself February 17th.

STATUS PRÆSENS.—R drum normal. L ear with a very little watery fluid which is a probable residue from syringing with hot water early this A.M. Drying this reveals a not very congested drum, which is somewhat opaque, position good, proc. brevis visible, and on its posterior edge, exactly on the border, two small bloody vesicles, perhaps more on the wall of the meatus than on the drum, were apparent. As the patient strongly objected to puncture, and in fact fainted after Politzer, concluded to let them alone, especially as there was only a very indefinite bubbling and no appearance of serum in middle ear. The drum moved on Valsalva's experiment and patient was directed to repeat this frequently after gargling and spraying nostrils. Only warm water was instilled into ear. H D R ear 7 feet; L ear, 26 in.; after Politzer 50 in. The next day patient reported more deafness, no pain, and some bubbling on inflating ear. The drum was somewhat reddened and slightly convex. The vesicles had broken during night, but patient reports only slight bloody discharge. H. D. R ear, 10 in.; after treatment, twenty in. Desired patient to submit to puncture of drum, but could not succeed in overcoming aversion until on the second subsequent day when it was done, as there was a great decrease

in the hearing distance, as also considerable pain. The puncture was followed by mucus and serum, and the H D was improved from 6 in. to 10 in. No re-puncture was later necessary, the H D steadily improved and the patient discharged when the latter had reached 48 in., as it did on the 14th of March. By the 6th of June the hearing distance had not improved. No subsequent test.

The next case came at a considerable interval later, consulted me in July for the first time, reporting chronic discharge from ears which had existed for ten years at various intervals. A late attack of the grippe had been very slowly recovered from and was followed by a relapse from which she thinks herself not to have fully recovered. Her ears in any case have been very much worse.

CASE 4.—Mrs. A., thirty-one years, comes with discharge of blood from right ear during the last few days ; left ear very much stopped. No pain or especially acute symptoms. STATUS PRÆSENS.—Right ear full of pus. L ear cerumen and detritus from an old purulent process. Removal of pus in right ear disclosed a drum wanting as to its posterior half, very much thickened and slightly reddened. In the middle ear posteriorly abundant granulations. Cleansing of the left ear showed exactly similar status save that all was quiescent, there being no discharge. Patient was put upon a disinfectant wash for right ear, and the granulation thoroughly cauterized with chromic acid. Some little reaction followed but was easily subdued and case progressed nicely. The H D at this time was about the same for both ears, eight in.

In the latter part of the month patient came complaining of increased deafness and slight pain in left ear. Examination showed slight redness, not enough to make an especial change in treatment except as regards nose and throat. The next day patient had intense earache and deafness on the left side with toward night some bloody discharge and no relief to suffering. On arriving at house at midnight found the ear full of yellowish-red discharge, and on removal of this, three hemorrhagic vesicles. One occupied all the surface of old perforation and covered part of membrana flaccida, another was limited to anter. inf. quadrant of drum, while the third, which seemed collapsed, was very small and occupied the upper part of ant. sup. quadrant. All three were punctured, and considerable dark-red fluid evacuated, but no more than one might suppose the vesi-

cles themselves to contain. Politzer's experiment, while very painful, produced no addition to the fluid in the ear. None of the vesicles entirely emptied themselves. With only a dose of sulphonal patient slept well that night and was much easier the next day. The vesicles still contained blood, and ear discharged reddish serum. I was called out of town next day and did not see patient for three weeks. At the latter date the ear was discharging pus and showed many granulations, the old purulent otitis media having been lighted up. The subsequent history was uneventful, except that the recovery was very slow. By October 27th all discharge had ceased in both ears. H D 10 inches, right. Left, 12 inches.

CASE 5,—although early in date—May 18th—I have left to the last. Previous history showed that he had as a young child some earache, never any discharge for any length of time, with the appearance of a "blister" on external ear on one occasion. Had not had regulation grippe, but during last two weeks had been gradually developing a general malaise, for which he had been kept from school for the last week. Yesterday the left external ear developed a peculiar large "blister" upon the edge of pinna and became painful as in an ordinary earache. At the same time the whole external ear began to swell, grow red, and stand out from the head. Last night great pain and some deafness with considerable constitutional depression.

STATUS PRÆSENS.—Well-nourished boy, fifteen years old, considerably flushed in appearance, with left ear standing far out from head, the same red, tender, and with two bullæ on the posterior edge of pinna. The mastoid region was very tender on pressure and swollen. The meatus was filled with serum of a similar character to that which came from the breaking of the bullæ on the pinna. It stiffened linen slightly on drying. Within the meatus was what appeared to be a vesicle over drum completely masking the picture; contents bloody in color. Temperature taken in the mouth, 104.4°. Pulse 130, rather weak. Syringing ear had no effect on the vesicle. Punctured it, however, with its complete collapse following. An attempt was made to puncture drum, as the fever and swelling in mastoid seemed to point in that direction, and the complication of mastoiditis was at least imminent. In attending to ear the bullæ on the pinna had rather been forgotten. The drum was not reached, at least Politzer failed to make any addition to fluid

or produce bubbles. Four leaches were set at 6.30 P.M.; foot-bath, cathartic, ice to mastoid region, and antipyretic ordered. Early the next morning the patient was seen and the swelling had begun decidedly to leave the posterior aspect of ear and to wander into temporal region, whither also the redness and quite a crop of vesicles ten or twelve in number grouped into a place as large as a silver dollar, radiating somewhat as the pes anserinus of the seventh nerve. Temperature 103.6° F. Syringed ear, finding it impossible to get at drum, concluded to wait, as the mastoid on deep pressure was not tender. Whiskey was ordered and frequently administered, as patient was much prostrated. From now on I deemed the ear one of pemphigus. At 5 P.M., temperature 104°; pulse, 120. No earache, and very little headache. Left eye is beginning to be painful, and the lids are beginning to swell. By careful drying was enabled to reach left ear drum and punctured the same, with considerable serum following both Politzer and Valsalva. The vesicles had all disappeared from the immediate neighborhood of ear, leaving a dry encrustation which resembled a thin layer of mucilage, where it drys on the finger. The whiskey was supplemented with iron, and antipyretic was repeated. Next morning, temperature 102.4°. Pulse, 115. Evening, 103.2°. Pulse, 120. Ear discharging mucus and serum. The crop of vesicles was all over under lid of left eye in the morning, while both lids were intensely swollen and reddened. They could not be opened, except by much traction, but eyeball was unaffected. By night the vesicles were on the bridge of nose and down on the ala of left side. Ten grains of quinine was the evening dose of antipyretic. The following day began as the previous: Temperature, 102.4°. Pulse, 104. Evening temperature, 103.8°. Pulse, 125. I had supposed that the median line would not be invaded by the vesicles, but was doomed to disappointment, for in the morning they were already on right side of nose and on the lids of right eye, which reacted almost as much as the left. As fast as the vesicles progressed, the old ones burst or dried up, and so the area covered by good, discreet vesicles was about the same in extent from the second day on. The fifth day was ushered in by a temperature of 98°. Pulse, 95, and quite strong. The evening temperature was 102.° Pulse, 105. During the day the vesicles had wandered across the face, and by evening the vanguard were in the temporal region bound for the ear, which latter, however, they never reached; for on the

next morning with a temperature of 98°, pulse 92, no new ones had formed in this direction, and the only addition was found in the supra-orbital region. The quinine was reduced that evening, and temperature did not get above 100°. The next day the temperature was normal all day, no new vesicles formed, and the swelling began to leave the face. In a few days everything was fully recovered but the ear, which discharged until the 16th, and the patient slowly, but without any relapse, gained strength.

I have deemed this case one of acute pemphigus, for the existence of the other vesicle-producing diseases was negatived by the history. It was not *herpes zoster*, because the traditional forms of this trouble do not possess bullæ, nor do they pass over the median line and steadily progress upon the other side of the body. Erysipelas and erythema bullosum would have produced more intense redness than existed at any period of the attack, and the general swelling was not great enough for either of these, as I have seen them. To the evidence stated is that further added by the appearance of the patient to-day with the history of having had what the family termed the "grip" for a few days. Yesterday earache came on and with it a bulla on upper edge of auricle. On examination of ear a sub-epithelial hemorrhage was found on the drum in posterior half. No cold in the head had preceded, and yet the drum was drawn in and H D much reduced. Temp. 99.3°. The symptoms had all lessened the next day, and by three days had disappeared. The H D was not quite up to previous condition.

ADDENDUM.—Since the preparation of this paper was begun and in company with the appearance of undoubted cases of the grippe in New Haven, two cases of hemorrhagic vesicles in the external ear have been added to those already chronicled at length, and in the practice of a colleague in this city another has appeared. In my own cases the history thus far has been the same as in the cases mentioned. The patients were both about twenty-two years of age, one male and the other female, the former being affected on the right side, the latter on the left. Both suffered the most excruciating pain that it has ever been my lot to witness, and the former had a repetition of his

agony twice after the beginning, the formation of a new vesicle being the apparent cause each time. This seems to be frequently the case, that the pain in these cases is more intense than in the ordinary otitis media acuta. The second case had an immense gush of serum following the puncture of the drumhead, the fluid flowing out of the ear in a perfect stream immediately upon the puncture, and not ceasing at all for a half hour. No efforts at Politzer or Valsalva seemed to avail to so free the middle ear that the flow stopped for even a moment. This latter case had but two vesicles, the one away from the drum in the canal and the other on the posterior superior quadrant of the drum. The young man had in all four vesicles, and all were on the posterior half of drumhead, one overlapping on the adjacent wall of the canal. The cases are progressing as in the cases detailed.

THE USE OF ELECTRICITY IN CHRONIC AFFECTIONS OF THE MIDDLE EAR, WITH A REPORT OF THE FIRST TEN CASES SO TREATED.

By W. E. BAXTER, M.D., Bangor, Maine.

SURGEON TO THE EASTERN MAINE EYE AND EAR INFIRMARY; OPHTHALMIC AND AURAL SURGEON TO THE HOME FOR AGED WOMEN, BANGOR, MAINE.

IT is my wish in this paper to present to your notice some of the benefits obtainable from the use of the *constant current of electricity*, in the more obstinate forms of middle-ear disease of the catarrhal or proliferous variety.

The subject does not seem a very promising one. Aural surgeons as a general thing do not place much dependence on its use. Beard and Rockwell, in their work on Medical and Surgical Electricity, open their chapter on diseases of the ear with the following statement: "The diseases of the ear are less amenable to treatment by electricity than analogous diseases in most other parts of the body. Hence it is that there is no branch of electro-therapeutics where there has been such general disappointment, both among aurists and electro-therapeutists, as in diseases of the ear"; nevertheless, after having used this remedy for some time, and finding that in quite a large percentage of the cases on which it has been used, namely, cases that have not derived the expected benefit from the regular methods of treatment, that the results have been immediate, marked, and lasting, I still continue the use of this remedy in suitable cases.

My attention was called to the use of electricity in aural troubles by the remark made by a patient on whom I had

been using the galvanic current for exophthalmic goitre; for after having continued the treatment for three or four weeks by currents of from ten to twenty-five milliamperes, applied to the *cervical sympathetic*, as well as to the parts involved, the patient volunteered the remark "that since the electricity has been used, I have been freed from a buzzing, ringing noise in my ears that has troubled me for a year and a half, and that has been much worse whenever I took a cold." This corroborates the statement made by Politzer, "That electricity can be useful in ear troubles applied through the sympathetic," on the grounds that the beneficial results are obtained through reflex action, a statement that he admits is contested by Erb.

In treating diseases of the ear, it is the misfortune of most practitioners to meet with a various percentage of cases of middle ear disease that do not improve as fast or as much as one would be led to expect from the objective and subjective symptoms of the case; many of these same cases complain of the subjective noises, and feel that they would be well enough could this one symptom be removed or lessened. It is in this class of cases exclusively that I have used electricity, never using it until the patient has been under my charge from two to four weeks, and only then using it, if after having made use of inflation, catheterization, aural tampons, etc., and after having attended to the pharynx, naso-pharynx, and nasal cavities, no marked improvement has been found.

The benefit derived from this method of treatment is usually noticed by the patient after the second or third application, and the improvement is so much more marked in these cases that are to be helped than that derived from the regular treatment before used, that patients frequently volunteer statements relative to the help derived from the electrical treatment.

I have not been able to diagnose the cases that would be helped by this agent, and while many of these difficult cases are cases of proliferous disease of the middle ear, I am not prepared to state that the proliferous variety of middle ear disease is the only kind that is helped by elec-

tricity. Chronic middle ear disease, especially of the proliferous variety, is often complicated with disease of the internal ear; but cases showing any tendency in that direction, as shown by Rinne's tuning-fork test, by the power to hear better in quiet, by the relative power of hearing speech better than the watch, or by the diminution of hearing after inflations of the middle ear, have been excluded from the cases considered here.

When improvement takes place, it is most noticeable in the increased ability to understand speech; the tinitus is lessened; those feelings of pressure, of fullness, and of dullness are lessened or removed; the parts feel as if there was more life in them. In fact, in these cases the condition of things that patients so often wish for—namely, that if the subjective noises might be lessened that they could hear well enough—seems nearly attained.

The method of application that I use is simple. After placing the patient with the head inclined, the external auditory canal is filled with warm water, the aural electrode, a small wire insulated to within 2 *mm* of its point, is introduced into the auditory canal, and retained there by the fingers of one hand, leaving the other hand free to manipulate the switch, rheostat, and pole changer; the other electrode, one covered with a sponge, is held in the hand by the patient. The current is then switched on and gradually increased, watching the milliampèremeter, until from five to ten milliampères of current are passing through the parts, then, retaining the electrodes in position, the poles are changed two or three times a minute. From three to six minutes is long enough for the applications to last. The ear is then dried, the patient kept quiet for a short time, to recover from the dizziness that is often produced. I repeat the applications daily or every other day for a period of one to three weeks. The milliampèremeter should always be used to measure the dosage of electricity, notwithstanding the statement made by Politzer "that the rheostat and galvanometer, indispensable for physiological experiments, are superfluous for therapeutic purposes," for only by the indications of this instrument has the practitioner means of

knowing the amount of electricity passing through the parts, for the resistance of the parts are different in different patients, and also is modified by disease.

I have not found it of any use to continue the electrical treatment if improvement is not noticed by the patient after the third application, so not much time has been wasted if help is not received.

The following are the first ten cases so treated, and have been under observation for six months from the date of treatment. They show a larger percentage of success than those treated since then, but the results on the whole are so satisfactory by bringing help to cases not otherwise relieved, that I am satisfied to continue the use of electricity in obstinate aural troubles.

It must be remembered that these ten cases were selected from the patients who showed no improvement after careful treatment of from three to six weeks; and remembering this fact, two cases of marked improvement in ten cases is a large enough percentage to warrant a further trial of electricity.

CASE 1.—Mr. G. H D R $\frac{28}{60}$, H D L $\frac{23}{60}$. After three weeks of regular treatment hearing improved to $\frac{30}{60}$ right, and $\frac{35}{60}$ left. Then used a *galvanic current* of from 5–10 milliampères. The patient noticed great improvement in the subjective symptoms after second application. After five applications of electricity hearing improved to $\frac{55}{60}$ right, and $\frac{60}{60}$ left, and especial improvement in the feelings of dullness and of pressure.

CASE 2.—Mrs. J. H D R $\frac{20}{20}$, H D L $\frac{60}{60}$. After four weeks of treatment by inflation and by the use of the catheter hearing improved to $\frac{37}{60}$ right. *Galvanic current* of from 5–12 milliampères applied three times with no improvement, so discontinued its use.

CASE 3.—Miss F. H D R $\frac{10}{60}$, H D L $\frac{17}{60}$. After six weeks of treatment by the usual methods only slight improvement noticed. *Galvanic current* gave improvement.

CASE 4.—Mr. K. H D R $\frac{0}{60}$, H D L $\frac{0}{60}$. No improvement from the use of catheter, aural tampons, or inflation. *Galvanic current* gave no help.

CASE 5.—Mr. L. H D R $\frac{5}{60}$, H D L $\frac{15}{60}$. After three weeks of treatment by inflation and by treating a naso-pharyngeal catarrh

hearing was improved to $\frac{20}{60}$ right, and $\frac{25}{60}$ left. *Galvanic current* of 10–12 milliampères used eight times—subjective noises greatly diminished, ears feel clearer, hearing improved to $\frac{44}{60}$ in both ears.

CASE 6.—Mr. S. H D R $\frac{0}{60}$, H D L $\frac{40}{60}$. Three weeks of treatment directed to the middle ear and pharynx made no improvement; no improvement from *galvanic current.*

CASE 7.—Mr. W. H D R $\frac{2}{60}$, H D L $\frac{4}{60}$. After three weeks of regular aural treatment hearing improved to $\frac{10}{60}$ right, and $\frac{16}{60}$ left. One application of the *galvanic current* caused intense pain in the ear that lasted for three hours; pain then gradually passed away and no further trouble noticed. Electricity was not used again.

CASE 8.—Mr. R. H D R $\frac{1}{60}$, H D L $\frac{P}{60}$. No improvement in the hearing after using the catheter and air-bag for four weeks. After using *galvanic current* twice patient thinks that he cannot hear as well.

CASE 9.—Mrs. K. H D R $\frac{P}{60}$, H D L $\frac{P}{60}$. Sprayed the throat, inflated, catheterized Eustachian tubes, and ordered aural tampons, with no improvement. *Galvanic current*, applied three times, gave no help.

CASE 10.—Mr. H. H D R $\frac{5}{60}$, H D L $\frac{4}{60}$. After three weeks of inflation, catheterization, and aural tampons no improvement in hearing. *Galvanic current* of 10 milliampères applied three times gave no help.

ON THE USE OF BENZOINOL FOR MOISTENING THE COTTON ARTIFICIAL MEMBRANA TYMPANI.

By Dr. JAMES A. SPALDING, Portland, Me.

FOLLOWING the usual habit of most aurists, I have for many years tested with the cotton artificial membrana tympani, for a possible increase of hearing, almost every case of old perforation of the *Mt*, with or without persistent otorrhœa. I have also used the rubber artificial membrane, as well as bits of paper, but generally the cotton dipped in glycerine, pure, or diluted with water, has produced the most satisfactory results; yet I can recall one patient in whom the use of the rubber membrane was very remarkable, though occasionally producing a discharge. The principal secret of the cotton "membrane," if it can actually be called by that name, lies in placing it precisely in the perforation, so as to bridge over the orifice. For this reason it is important to urge the patient to learn to insert it personally, for he can better tell when it is in position than the surgeon, who may have to ask question after question before he places it correctly. The second necessity is to have it small enough to pass freely to the end of the canal, yet large enough to cover the perforation entirely without wedging it too hard against the end of the passage or the remnants of the *Mt*. A third necessity is to have it moist enough, at first, so that it can remain *in situ* for a reasonable length of time, in order not to demand frequent

changing, whilst finally it should not be dry or irritating enough to excite discharge.

The shape does not seem to have any especial effect on the amount of hearing, for some patients hear best with a flattish disc of cotton, and others with a thin long piece which may even extend out of the meatus.

Having once determined in any given case that the hearing can be increased by the cotton, we should show the patients how to use it, for they cannot come every time to have it put in position, and they can be better judges than the aural surgeon whether the cotton has become so dry as to be irritating to the parts with which it comes in contact. Occasionally, too, it dries and falls out and requires replacement. For all these reasons it is safe and best to trust the patient with the management, as often the hearing once regained is in process of time lost by the drying or dislocation of the cotton.

All of these points and many others have repeatedly been detailed in these ARCHIVES, so that I need not go over them again. But my chief purpose in the reopening of the subject is to call attention to the use of benzoinol (which I take to be a purified benzoated oil of vaseline or liquid vaseline) for moistening the bit of absorbent cotton whenever the latter is found to be at all useful in cases of perforation of the *Mt.* The advantages that I have noticed from its use in comparison with glycerine, pure or diluted, are that it gives better hearing, and that it does not dry so soon, in other words, does not have to be changed so often. Nor is it so irritating as is occasionally observed after the use of glycerine. The few cases in which I have lately had an opportunity to use benzoinol on cotton have invariably shown that the same patient will hear *better, and for a longer period without a change of the cotton when dipped in this liquid than in glycerine.* One patient thus tested could hear twice as far with the benzoinol-soaked cotton as with that soaked in glycerine. Another could hear almost as much again. In all my cases the hearing was decidedly clearer with benzoinol than with the glycerine. I am sorry that I cannot state positively just how many patients I have

in whom the cotton pellet soaked in benzoinol increased the hearing noticeably over that obtainable with the same soaked in glycerine, but I am quite sure that the number is considerable enough for me to offer these hints to my *confrères* in the hope that they may obtain in these very undesirable cases as good results as I have so far been enabled to obtain.

One or two patients have complained of a disagreeable coolness produced by the cotton pellet thus treated, but it is the same with the glycerine application, and can easily be avoided by gently heating before using.

SOME REMARKS ON THE USE OF STYRONE IN CHRONIC SUPPURATION OF THE MIDDLE EAR, ESPECIALLY IN PERFORATION OF SHRAPNELL'S MEMBRANE.

By Dr. JAMES A. SPALDING, Portland, Me.

STYRONE is a compound of styrax and balsam of Peru, which was mentioned in the therapeutical journals some time ago as a very efficient antiseptic remedy; but owing to the great expense attendant upon its composition it did not come into general use. Lately, however, it has become comparatively cheap, and is sure to make a name for itself in general as well as special surgery. My attention was first called to the use of styrone in aural practice, by a paper of Chelstoff's, and I at once began to use it in any obstinate otorrhœas that came under my care. This remedy has to me a very pleasant odor, and one that most effectually masks that of the most disagreeable discharges from the ear. For this reason only, even if styrone possessed no other valuable properties, it would be far in advance of iodoform and other antiseptics, many of which mostly substitute one bad odor for another. The new remedy can be used largely diluted with alcohol (1 per-cent. to 5 per-cent.) to syringe out the meatus, or it can be dropped in the same strength into the meatus, after this has been thoroughly cleansed with water. Chelstoff made some interesting experiments to decide if it were not the alcohol which diminished the discharge in cases where the alcoholic dilution of styrone had been employed; and was able to

prove, without a doubt, that the styrone (with the alcohol) was successful where the alcohol had been used alone in vain. I would not, however, call attention so much to the use of styrone in ordinary cases of otorrhœa, in which it is very efficacious, as in those obstinate cases of perforation of Shrapnell's membrane, with more or less abundant serous and disagreeable discharge. In these, all sorts of antiseptics and astringents had been essayed, without much if any benefit, and the patients were averse to any attempt at an operation, for the ordinary use of the syringe in the meatus or introduction of the tympanic syringe through the perforation was so often followed with vertigo and nausea that an operation without ether was out of the question, and even with it the patients' courage failed. I showed the patients how to pass a minute cotton-tipped probe into the perforation lying high up in the end of the meatus, and then they used the alcoholic solution of the styrone, lying down, or even passing a pillow under the neck so as to elevate the head and permit the liquid to flow into the perforation. It ought to be done twice daily at the start, whilst later, once a day is enough. If the patients are not sensitive to the use of the tympanic syringe, the styrone can in that manner be much more efficiently used than by merely letting it enter the meatus by gravity alone.

The few cases of perforation of Shrapnell's membrane in which I have used styrone have shown that it is a very useful remedy in reducing the amount of the discharge and overcoming its disagreeable odor, even if it did not entirely cure the obstinate disease. Out of three recent cases, long enough under observation to prove the value or uselessness of the new remedy, two were absolutely cured in six weeks, and the third showed a very considerable diminution in the amount and the odor of the suppuration. Others still under care are progressing favorably, though as yet undecided.

I generally use the weak alcoholic solution, diluted with water, and heat it gently over a flame. After a few applications, I direct it to be used in the full strength of the solution (about 2 per-cent. to 5 per-cent.). In my opinion it is well worthy of a trial in any obstinate case of otorrhœa,

whilst future observation will decide the precise strength which is the most valuable.

I employed it in a single case of aural polypus, but it did not seem to act any better than alcohol alone. In conclusion, I would say that in every case I have used the liquid styrone, as distinguished from the crystal, though both possess the same antiseptic and deodorizing properties.

FOREIGN BODY REMAINING WEDGED IN THE EXTERNAL AUDITORY MEATUS TWENTY-FOUR YEARS WITHOUT INJURING THE HEARING. REMOVAL WITH A HOOK AND SYRINGE.

By Dr. JAMES A. SPALDING, Portland, Me.

THERE is nothing particularly interesting about this case except the extreme length of time which the foreign body remained in the meatus without doing any harm. For this reason it seems to me that the case should go on record as the one of the longest continuance of a foreign body in the meatus.

A. M. P., aged 28, called to see me one day for the removal of a foreign body which had been in his right ear for 26 years. He knew that it was a bit of hickory-nut shell; but he was very much afraid that any attempt at removal would injure the drum-head, which had so far remained intact, as well as he could judge from the fact that there had never been any discharge from the meatus, and that the hearing was intact. Examination revealed a large mass of cerumen in the meatus, and on syringing it away with the syringe, a foreign body was plainly seen wedged in across the lower end of the meatus. As repeated efforts with the syringe failed to dislodge the intruder, I passed a small hook in behind it, and with gentle force pulled it from its long resting place. The *Mt* was then seen to be intact. After removing the rest of the cerumen from the foreign body it was found to be the old bit of nut shell which, according to family tradition, the patient had, at the age of two years, pushed into his ear.

Careful tests of the hearing proved that the faculty in this ear was as perfect as in the other.

A CONTRIBUTION TO THE MORPHOLOGY OF THE HUMAN AURICLE.

By Prof. GRADENIGO, of Turin, Italy.

Translated by Dr. J. A. Spalding, Portland, Me.

EMBRYOLOGICAL and anatomical investigations have shown that the human auricle originated by reduction from the highly developed auricle of certain classes of mammalia. We find in those mammalia in which the auricle is highly developed, adapted for the reception of waves of sound, and moved by peculiar muscles, that the cartilaginous plate of which it is most largely composed, is interspersed with striæ or concretions, which greatly resemble the veining in leaves of plants, and may serve to add rigidity to the cartilaginous plates themselves.

These striæ can be divided into two main systems as I have elsewhere shown,[1] first into those which run longitudinally, *i. e.*, from the tip to the base of the auricle, perpendicular to its insertion (longitudinal stripes), and second those which run parallel to the base, are arranged concentrically, and which I have called by the name of antihelices because they bear a great resemblance to the striæ which in the human anatomy go by the name of the antihelix. These striæ in animals often interlace with those of the other system.

The strongly marked longitudinal striæ in the auricles of sheep- and cattle-embryos were repeatedly seen by Schwalbe

[1] Die Formentwick. d. Ohrmuschel. *Centralbl. f. d. med. Wiss.*, 1887, Nos. 39, 40, and 41.

and myself at a certain stage in the auricle of human embryos.

We occasionally see in the human auricle, as an anomaly, a minute stripe, which belongs to the set of longitudinal striæ, in the so-called triple division of the antihelix. This is represented by the third anomalous division starting from the locality of the usual bifurcation of the antihelix or about the middle of the upper limb, and running backward and upward toward "Darwin's tip." I have also seen in a few other human specimens a second stripe less marked than the one just mentioned, converging posteriorly with the same, and belonging to the system of longitudinal striæ.

The oblique striæ in transverse sections in the longitudinal axis of the auricle are less distinctly represented in man, but to this group belong: (*a*) the body and upper limb of the antihelix; (*b*) the lower limb of the antihelix, which in its development, as well as from an anatomical point of view, is different from the rest of the antihelix.

I consider it interesting and worthy of publication that, amongst the anomalies of the human auricle I have recognized the existence of two well-pronounced striæ which must be regarded as accessory antihelices. And as such have never before been mentioned by any author, I will briefly describe them.

One of the striæ which is rarely so perfect as the first photograph represents it, marks the elongation of the lower limb of the antihelix downward and forward, so that the stripe, although bent into an S-shape, runs almost parallel with the antihelix itself, and terminates on the floor of the cymba conchæ directly over the crus helicis. Generally we see nothing that corresponds to the lower member of the antihelix or that portion of the stripe which runs as the middle isolated line on the floor of the cymba or concha.

The second very rare stripe is concentric with the body of the antihelix. Compare the photographs.[1]

[1] The above communication is the substance of a paper read before the Otological Section of the International Medical Congress held in Berlin, August, 1890. The photographs exhibited there have been omitted in the present publication.

DIAGNOSIS, PROGNOSIS, AND TREATMENT OF PROGRESSIVE DEAFNESS IN CHRONIC NON-SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR.[1]

By Prof. GRADENIGO, of Turin.

Translated by Dr. J. A. Spalding, Portland, Me.

THERE can be no doubt that the progressive deafness of chronic non-suppurative inflammation of the middle ear is one of the most important questions that modern otology has to consider.

We cannot say that all of the recent investigations and observations made in this province have been entirely fruitless, and yet it must be confessed that many important questions concerning the pathogeny and the treatment of this disease are still awaiting a solution. Pathology has demonstrated that the vast majority of inflammations of the middle ear with an intact *Mt*, are due to the extension of diseases of the naso-pharynx into the tympanum along the Eustachian tube. Bearing in mind this universal pathogenic doctrine, there is evidently no therapeutic value to be attached to all those fine distinctions which have been made concerning the various clinical forms of chronic catarrhal inflammations of the middle ear. The disease is generally characterized by a slowly progressive catarrhal process which usually has its seat in the middle ear, but which often extends to the inner ear, and so gives rise to more or less complete deafness.

[1] Read before the Otological Section of the International Medical Congress at Berlin.

From a prognostic point of view we can discuss two chief points:

1. Whether, together with the functional disturbances which are to be referred to the conducting apparatus, there may or may not be present functional disturbances which are due to trouble in the inner ear (absence of bone-conduction for the watch, diminution of hearing for high tones, and attacks of vertigo).

2. Whether the *Mt* is retracted or not.

These various occurrences may combine in the most complex manner in each individual case. We meet in our practice with forms representing the gradual transition from simple stenosis of the tubes to the so-called sclerotic inflammation of the middle ear; then, again, we observe the rapid transformation of a slight form into one more severe, in one and the same ear. The following are the most frequent types:

a. Moderate degree of concavity and hyperæmia of the *Mt;* watch heard on contact; diminution of hearing for low tones especially; constant or intermittent tinnitus; better perception for tuning-fork at vertex in the more affected ear; sclerosis of the tubes; hypertrophic inflammation of the mucosa of the naso-pharynx, with an occasionally increased or altered secretion from the former. Improvement occasionally observed after the use of the air-bag.

b. Mt not concave, but reddened and glistening; constant tinnitus; watch rarely heard on contact; fork not lateralized in either ear from the vertex. The rhinoscopic examination demonstrates slight alterations in the mucosa whilst dry; granulated pharyngitis is present. With proper treatment an improvement is easily attained.

c. Mt is whitish, occasionally thickened in spots, and not retracted at all; tube pervious; tinnitus occasionally persistent; vertigo never observed at all; watch not heard on contact; diminution of perception for high tones. Treatment brings about no improvement. Naso-pharynx nearly normal.

d. Objective condition about as in the last class but no tinnitus or vertigo; hearing for low tones noticeably

decreased. In this group of cases the morbid alterations must be largely referred to the sound-conducting apparatus.

e. Mt almost normal in appearance; the subjective symptoms are largely to be referred to the inner ear (persistent tinnitus of various qualities, attacks of vertigo, diminution of hearing for very high tones, and a positive Rinne). Slight alterations in the naso-pharynx.

We can say on the whole that in some forms the morbid alterations affect the *Mt* (hyperæmia and retraction of the same) and the tube, whilst in others it is the vestibular wall (stapedio-vestibular anchylosis) which has been attacked. Finally, there are cases in which the inner ear has suffered. Now these differentiations in the locality of the disease justify a difference in our prognosis of the case in question. The symptoms in the first class are for the most part removable, and can be improved by proper treatment even if not entirely cured, whilst if neglected they may assume the appertaining forms of the second and third group which are much more serious.

The morbid process in the last class has a tendency to become progressive (occasionally with great rapidity) and to lead to a degree of deafness which may in time become total. We can never be too guarded in our prognosis in every case because the forms of the first group, which with suitable treatment rapidly improve during the first fifteen or twenty days, occasionally deteriorate later, despite the continuation of the same treatment (or perhaps owing to the same?) and pass over into those cases of the second or third groups.

Which treatment is the best, in these chronic catarrhal inflammations of the middle ear which are so frequent and so important in their prognosis? When we look over the innumerable papers that have been written on the subject we are astounded, and at the same time discouraged, by the multitude of remedies that have been proposed to antagonize the disease in question. For their very number goes to prove their uselessness. These we may now collect into the following categories:

I. Direct treatment of the ear.

A. From the external meatus:

a. Massage of the ossicles (Lucae).

b. Massage of the *Mt* (rarefactor, *masseur* of Delstanche).

c. Surgical treatment within the tympanum (plicotomy, myringotomy, myringectomy, tenotomy of the tensor tympani [Weber-Liel, Cholewa], mobilization of the stapes [Miot, Boucheron]).

B. From the tube:

a. Catheterization; simple air douche.

b. Injection of atomized remedies into the tympanum by means of the catheter (sal ammoniac, ether, chloroform, iodoform [Delié], iodine [Loewenberg], etc.).

c. Injection of liquid substances by means of the catheter into the tympanum (alkaline solutions [Politzer], iodide of potassium [de Rossi], pilocarpine, cocaine [Kisselbach], iodoform, vaseline [Delstanche], etc.).

d. Methodic introduction of celluloid bougies and massage of the tubes (Urbantschitsch).

II. Local treatment of the nose (irrigation, penciling, galvano- and thermo-cauterizations (Paquelin).

III. General treatment, such as iodide of potassium, arsenic, atropin, eserin, ergotin (Gradenigo), and quinine.

IV. Electric treatment (galvanic current [Brenner, Hagen, Erb], interrupted current [Eitelberg]).

If we leave aside the surgical treatment within the tympanum, and the naso-pharyngeal medication, of which I will farther on say a few words, we must after all confess that all of the remedies which I have just catalogued are of but little more than mere temporary use. The massage of the ossicles as recommended by Lucae is something that most patients cannot easily endure, though Delstanche's massage of the *Mt* by means of his *masseur* is much more advantageous and more easily borne. I have more than once observed that after trying this treatment the subjective noises have decreased in intensity, and occasionally, though only for a brief period, completely disappeared, while in the same patients the use of the air-bag either did not modify them at all, or even made them worse.

Good results are obtained in many cases by the use of the air-bag and the catheter, whilst the very same means in other cases seem to make the hearing worse, and to increase the intensity of the subjective noises. Loewenberg has demonstrated that the air douche is not indicated in the *dry forms* of inflammation of the middle ear, and that it may even urge the morbid process onward in its deleterious march.

So, too, the injections of liquids or atomized substances through the tubes into the tympanum produce but transitory results. It is, moreover, doubtful whether they do not actually increase the evil already present. In point of fact, such injections irritate and congest the mucous membrane of the entire *Mt*, as we can easily demonstrate by inspection; the improved hearing which follows the act is generally due to a mobility of the ossicles produced by the swelling and hyperæmia of the mucous membrane. Such constant and renewed irritation of the parts of the middle ear may tend to favor the advance of the morbid process.

The methodic introduction of bougies into and through the tubes may very advantageously assist various other methods of treatment, especially when catarrh or cicatricial strictures are present, but alone they are, in my opinion, of very little if any use.

I once expressed myself very favorably inclined to a general constitutional treatment,[1] such as ergotin and atropin, in certain forms of this disease, particularly on account of the nervous and vascular disturbances observed in many of my patients. But now I have to say that I have abandoned this idea *in toto*, and am inclined to regard these nervous and vascular disturbances as due to alterations in the mucosa of the naso-pharynx and tympanum.

The use of the galvanic current has never afforded any permanent increase of hearing to my patients.

It seems to me that the only way in which to obtain a rational and efficacious method of treatment is to study the exact pathogenesis of every case. Pathological and anatomical researches have taught us that in these cases we have to

[1] Sulla pathogenesi dell' anchilosi stapedio-vestibolare. *Rivista veneta di sc. mediche*, 1887.

do with a slowly progressive inflammatory process, which terminates in sclerosis and retraction. Clinical experience testifies that this process is analogous to those which are going on in the mucosa of the naso-pharynx, and that in the few cases in which our examination reveals no alterations in the latter district, the history of the patient shows that such must have been present at an earlier stage, so that from a practical point of view there arises before us the very important question whether chronic catarrhal inflammation of the middle ear is or is not of an infectious nature?

In order to obtain an answer to this question I have made a series of investigations, which I shall briefly mention.

A. I examined two cases (post-mortem) of typical chronic catarrh of the middle ear, under the microscope, for the presence of micro-organisms, but both resulted negatively.

B. I made investigations on the living by means of cultures, taking six cases of typical sclerosing otitis (after accurate sterilization of the external meatus, and of the material destined for the cultures) and making a large perforation in the *Mt* of the worse ear with the galvano-cautery. Through the perforation I passed a sterilized platinum wire moistened with water, pushed it on till it came in contact with the promontory, with which I distinctly rubbed it, and then I made in the usual manner cultures on various soils. The culture remained sterile in four cases, and in the other two there was only the accidental culture of the microscopic cereus albus of Fluegge, a type often observed in the atmosphere.

C. Prof. Maggiora and myself examined the contents of the tube, with the idea that if the chronic catarrhal inflammation of the middle ear had any connection with infectious affections of the naso-pharynx, the pathogenic germs might easily pass into the tubes. I will not at this place detail the procedure that we followed, for it will later see the light elsewhere, but I may say in brief that we discovered nothing except a few specimens of the bacteria of putrefaction.

Basing our views on these investigations, we must believe that at least the atrophic and sclerotic forms of

catarrhal inflammation of the middle ear are quite independent of the influence of pathogenetic micro-organisms.

Our investigations in this line of thought were supported by the fact that all energetic antiseptic treatment of the disease in question was useless. We tried in vain the prolonged use of ten per cent. to twenty per cent. of carbolic acid and one per cent. of sublimate in the meatus. Irrigations with one to two per cent. of salicylated solutions were equally of no effect. And more than that, direct treatment of the mucosa of the tympanum through an opening made in the *Mt* with the galvano-cautery, and irrigation through the tubes with salicylated solutions with free exit through the external meatus produced no result at all or only so slight as to be inappreciable. But on account of the opinion that the chronic catarrhal affections of the middle ear, in general, are connected with peculiar pathological alterations in the mucosa of the naso-pharynx, we ought, instead of resorting to antiseptic measures, to try such as may influence the vitality of the tissues affected. Amongst these we have the galvano-cautery, nitrate of silver, iodine, etc. I treat the mucosa of the naso-pharynx directly, especially near the pavilion of the tubes, with a cotton-tipped probe in the shape of the usual Eustachian catheter. In addition to this, I employ Delstanche's *masseur* upon the *Mt*, but for not more than one minute at a time. Whenever the proper indications exist for its use, I employ the air-bag and the catheter, and bougies in the tube. In these ways I obtain very good results (permanent improvement of the hearing, even when the treatment is abandoned, and diminution of the tinnitus), and not only in fresh cases, but occasionally in those of longer standing, not alone in those in which there were great alterations in the mucosa of the naso-pharynx, but in others where such were entirely absent. Patients who had not obtained the slightest benefit from a long-continued direct treatment of the ear as well as injection into the tympanum, obtained, on the contrary, from careful treatment of the naso-pharnygeal mucous membrane, decided advantage.

ON THE PERFORATIONS OF THE MEMBRANA FLACCIDA SHRAPNELLI, WITH REMARKS ON THE FORMATION OF CHOLESTEATOMA.

By Dr. E. SCHMIEGELOW, Copenhagen.

Translated by Dr. Ward A. Holden, New York.

(With six figures in the text.)

THE purpose of these pages is to furnish a small contribution to the study of suppurative inflammations of the middle ear that are accompanied by perforations in Shrapnell's membrane. This form of suppuration of the middle ear has so much that is characteristic in its manner of development, course, and sequelæ that it is strange that the attention of otologists has only been called to the importance of this condition within the last decade, the literature really beginning in 1883, when Morpurgo[1] gave a detailed description of this form of middle-ear disease, based on eleven observations. It should, however, be remarked that earlier authors have observed and mentioned it.

Moos[2] seems to have been the first who observed it, since he speaks in his "Klinik der Ohrkrankheiten" (p. 126) of a crescentric perforation above the processus brevis, with another perforation in the anterior segment, and again (p. 127) he says: "The perforations at the upper pole above the short process are remarkable, since they are rarely seen. I recollect some few cases in which I have found healed perforations in this region."

[1] Morpurgo: Beitrag zur Path. und Ther. der Perforationen der Shrapnell'schen Membran, *Arch. f. Ohrenh.*, vol. xix., p. 264, 1883.

[2] Moos, "Klinik der Ohrkrankheiten," Vienna, 1866.

In 1874, Orne Green[1] described the affection in a paper entitled "An Unusual Variety of Purulent Inflammation of the Tympanum." He considered it catarrhal inflammation that became purulent and finally total, "but the mucus secreted among the ligaments and other structures in the upper part of the tympanum is unable to gravitate to the floor of the cavity on account of its confined position."

In 1875, Blake[2] reported two cases of perforation of Shrapnell's membrane; in one case there was a second large perforation in the lower segment.

Burnett[3] considered the affection rare, and reported five cases, one of which was not a perforation of Shrapnell's membrane, but merely a superficial inflammatory process caused by the irritation of a plug of cerumen.

In 1876, Buck[4] described two cases of acute inflammation of Shrapnell's membrane, in which the remainder of the ear was not involved.

In 1879, Bezold[5] referred to this question in his paper on the treatment of middle-ear suppuration with boric acid, and stated that those cases of suppuration in which there was a perforation of Shrapnell's membrane or a polyp at this point, were not adapted for this treatment. According to his observation, localized purulent processes behind Shrapnell's membrane causing perforation are not rare. He reported seven cases and gave a detailed account of the ætiology, pathogenesis, and symptomatology.

In the third volume of the *American Journal of Otology*, Burnett supplements the five cases mentioned in his book with five new ones, and distinguishes three varieties of the affection: (1) Perforation in the posterior portion of the membrana flaccida usually accompanied by marked pus-formation and deafness, and complicated with suppurative processes in the mastoid process; (2) central perforation

[1] *Boston Med. and Surg., Jour.*, Mar. 6, 1874.
[2] *Trans. Amer. Otolog. Soc.*, vol. i., p. 546, 1875.
[3] "The Ear: its Anatomy, Physiology, and Diseases," Philadelphia, 1877, p. 336.
[4] Report of the First Congress of the Internat. Soc. of Otology and *Arch. f. Ohrenheilk.*, vol. xii., p. 313.
[5] "On the antiseptic treatment of suppuration in the middle ear," *Arch. f. Ohrenheilk.*, vol. xv., p. 15, 1879.

accompanied by less suppuration and functional disturbance, and for the most part associated with diseases of the external canal; (3) perforation in the anterior portion of the membrane, usually accompanied by affections of the nose, tube, and tympanic cavity.

Following this come isolated reports by Prussak,[1] Schwartze,[2] Urbantschitsch,[3] Marian,[4] Habermann,[5] and an exhaustive discussion of the question by Politzer,[6] by which it appears that the matter had attracted some attention before 1883, but it was only after the appearance of Morpurgo's[7] account of its pathological importance that the affection was generally recognized by otologists, and in the following years a series of important papers were published which led to the correct understanding of the clinical importance of the affection.

Morpurgo described the clinical aspect of the affection, and considered it a suppuration in Prussak's space. Hessler[8] followed Politzer, and considered the affection a chronic suppuration of the system of cavities between the neck of the malleus and Shrapnell's membrane, first described by Politzer.

Kretschmann believed the seat of the suppuration to be more extensive, since in his opinion both normal and pathological conditions indicate that neither Politzer's system of cavities nor Prussak's space could be considered the sole location of the suppuration. The fact that the perforation is some distance from the processus brevis, or that the entire membrana flaccida is found to be destroyed, indicates that the suppuration is of far greater extent, and probing will show, in most cases, that far greater cavities are involved than those described by Prussak or Politzer.

[1] Prussak: On the Anatomy of the Human Membrana Tympani, *Arch. f. Ohrenh.*, vol. iii., p. 266.
[2] Schwartze in Klebs' "Handbuch der Path. Anat.," pp. 59–66.
[3] Urbantschitsch, "Lehrbuch der Ohrenheilk."
[4] Marian: Reports on Ear Patients Treated between Oct., 1878, and Oct., 1880, *Arch. f. Ohrenheilk*, vol. xvii., p. 87.
[5] Habermann: Report of Prof. Zaufal's Ear Clinic, 1880. *Arch. f. Ohrenh.*, vol. xviii., p. 86.
[6] Politzer, "Lehrbuch der Ohrenkr.," 1878, p. 484.
[7] Morpurgo, *l. c.*
[8] Contributions to the Pathology and Therapy of Perforation of Shrapnell's Membrane, *Arch. f. Ohrenh.*, vol. xx., p. 121.

Kretschmann's investigations lead him to believe that the affection is localized to a space bounded externally by the tympanic portion of the superior wall of the external canal, together with the upper portion of the membrana flaccida, while the floor is formed by the membrane which fills the space between the outer wall of the tympanic cavity on the one side, and the malleus and incus on the other. The space is bounded internally partly by the head of the malleus and the corpus incudis, partly by the medial membrane, which descends from the roof of the tympanic cavity to the upper margin of the head of the malleus and the corpus incudis. The head of the malleus and the neck above the crista are included within this space; the malleo-incudal articulation lies, for the most part, outside. The communication between Kretschmann's space and the rest of the tympanic cavity is in the medial side of the space above the crus breve of the incus, which separates the aditus ad antrum mastoideum from the space like a septum. In some cases the communication is between the crus breve incudis and the pars squamosa of the temporal bone (*l. c.*, p. 176). The space is intimately connected with the mastoid antrum. While Prussak's space lies beneath Kretschmann's space, Politzer's system of cavities forms a part of the space, but is "relatively so small and delicate a structure that it need not be considered in this connection" (*l. c.*, p. 177). In cases of suppuration within Shrapnell's membrane, there are two points which attract the attention of the otologist, and make it difficult to understand how the disease has originated. In the first place, it is strange that a perforation of Shrapnell's membrane is never found in acute inflammation of the middle ear; and secondly, it is difficult to understand how middle-ear suppuration which has developed from infection per tubam can be localized behind the membrana flaccida without there being, as is often the case, actual pathological changes in the remainder of the tympanic cavity. Walb[1] attempted to explain the cause of this

[1] Walb, Ueber Fisteloeffnungen am oberen Pole des Trommelfells. *Arch. f. Ohrenheilk.*, 1888, vol. xxvi., p. 185. Bezold, Cholesteatom, Perforation der Membrana flaccida Shrapnelli und Tubenverschluss. *Zeitschrift f. Ohrenheilk.*, 1889, vol. xx., p. 5.

condition in a new and novel manner. He believed that there were rare cases in which a primary middle-ear suppuration was the cause of the development of a fistula at the upper pole of the membrana tympani, but that in the great majority of cases an affection of the external ear produced it. This occurs (1) either because an otitis externa circumscripta affects the point between the membrana flaccida and the wall of the external canal, or an otitis externa diffusa encroaches upon Shrapnell's membrane; or (2) because a disease of the external ear, accompanied by secretion,—the region of Shrapnell's membrane not being affected,—produces an infection of the tympanic cavity inside the membrana flaccida through the foramen Rivini. Walb believes such a foramen Rivini to be frequently present.

Bezold objects to this explanation until thorough investigations on the ears of new-born children have proven that a patulous foramen actually exists. Bezold has observed small dry openings at the upper margin of Shrapnell's membrane, but so long as a similar condition is not observed in new-born children, it is doubtful whether the perforations found in adults are normal or the results of previous suppurations.

As was stated above, it is very rare to find fresh perforations of Shrapnell's membrane in cases of acute suppuration of the middle ear. Bezold[1] says that he has never had an opportunity of meeting a fresh case of perforation and following it clinically. Brückner, in his atlas, has pictured a perforation of the membrana flaccida in a case of middle-ear suppuration. Among my cases of perforation at the upper pole of the membrana tympani, I have twice had the opportunity of seeing the disease in the beginning.

In the first case the disease developed while the patient was under my treatment for adenoid vegetations in the naso-pharynx; in the other case the patient came to me two days after the perforation had taken place. The cases were as follows:

1. A man, æt. twenty, who had been operated on for adenoids Sept. 28, 1883, noticed a pain in the left ear some days later;

[1] Bezold, *l. c.*, p. 20.

there was a purulent discharge, and examination showed a perforation of Shrapnell's membrane just above the processus brevis; the membrana tympani was diffusely swollen and red; watch heard on contact; communication with the tympanic cavity. The suppuration ceased after a week, with daily catherization and injections of two per-cent. boric acid solution per tubam.

Oct. 23d.—There is a clear perforation sound; watch heard at 40 *cm*; no discharge.

Nov. 21st.—The exudation in the middle ear has disappeared; discharged with normal hearing.

2. A man, æt. forty-nine, came to me September 14, 1887, complaining of having had a severe pain in the left ear six days before, at which time he was suffering with a coryza. His sleep was disturbed. Two days before, the ear began to discharge and the pain decreased somewhat, but returned at intervals and is most violent behind the ear. Neither giddiness nor nausea; watch heard on contact, and the voice quite near the ear. He has a sensation of heaviness in the left side of his head. The mastoid process is sensitive to pressure, but otherwise normal. The external canal is filled with pus. The membrana tympani is red, tense, and swollen. Pus trickles through a small opening just above the processus brevis. No perforation sound with catheterization. I ordered four leeches to the mastoid, syringing with borax water, instillations of boro-glycerine, and the ice-bag.

Sept. 15th.—He felt better and had no pain, but his head was very heavy.

Sept. 16th.—There is severe pain in the ear and in the left side of the head; mastoid not sensitive to pressure. The perforation is very small and located at the apex of the elevated Shrapnell's membrane; the remainder of the membrana tympani is red and tense. Although the air passes into the proper tympanic cavity in catheterization, there is no perforation sound. Paracentesis was made downward and backward, and after this there was a clear perforation sound with catheterization, and the patient's head felt lighter. He was then treated with injections through the tube, and was discharged October 16th with the membrana tympani healed.

We have here two cases of acute middle-ear suppuration arising from tubal infection, and accompanied by perforation of Shrapnell's membrane. In one case the suppuration

ceased very quickly, because there was communication with the remainder of the tympanic cavity permitting tubal injections. In the other case the symptoms were more severe, and the course more prolonged because there was no communication, but when drainage was improved by paracentesis, the suppuration soon ceased and the perforation healed.

I can also report a third case belonging to this catagory:

3. A man, æt. seventy, was referred to me April 19, 1890, on account of a discharge from the left ear, which had developed two months before in the course of a coryza, after a nasal douche had been prescribed by his family physician. Severe pain came on in the ear at once, and discharge two days later. He has had a continuous feeling of heaviness in the left side of his head, now and then painful twitchings in the left cheek, and constant pulsation in the ear. The discharge has never been offensive; no giddiness; watch heard on contact; the membrana tympani is red and swollen. Pus emerges from a small opening just beneath the roof of the external canal. There is no perforation sound, although the air penetrates into the cavity which is filled with exudation.

April 21st.—The external canal is dry, and at the point of perforation there is a bubble of pus the size of a pea.

April 22d.—There is less discharge through the perforation, but the remainder of the membrana tympani is swollen, red, and tense. A paracentesis was made with the galvano-cautery below; a quantity of pus escaped, and the subjective symptoms were relieved.

April 23d.—The swelling of the membrana tympani has disappeared, and the perforation, which is closing, is seen to be just above the processus brevis.

April 29th.—The suppuration is less; the perforation is closed; the subjective symptoms are improved; treatment stopped because of departure of patient.

This case was one of middle-ear suppuration of two months' standing, with perforation of Shrapnell's membrane. There can scarcely be a doubt as to the tubal origin of the disease, since the patient referred it to the coryza and especially to the nasal douche, which frequently, as is

well known, when used in cases of inflammation of the naso-pharyngeal space, causes a spreading of the inflammation to the middle ear. It was not possible to demonstrate a communication between the tympanic cavity and the cavity within Shrapnell's membrane with the air douche, but on the other hand the constant trickling of the pus through the perforation with no marked signs of retention, indicated a connection. The drainage was bad, however, and therefore a paracentesis was made in the upper segment of the membrana tympani, and a quantity of pus permitted to escape. The suppuration in the cavity within Shrapnell's membrane, which served only as a passage-way for the pus into the remainder of the tympanic cavity, ceased in a few days; the perforation at the upper pole healed, and daily injections through the tube improved his condition, although the suppuration had not entirely ceased when the treatment was interrupted.

Granted that the disease had existed for some time before it was noticed, we might suppose that the chronic inflammation had compromised the vitality of the folds of mucous membrane which lie above the processus brevis, stretching from the outer wall of the tympanic cavity to the head of the malleus and the incus. The disease would sooner or later have involved the neighboring bony parts, and have caused a carious destruction of the malleus, incus, and roof of the tympanum. In the course of months or years, the usual picture of chronic suppuration in this region would have developed, and Shrapnell's membrane would have shown a larger or smaller perforation through which the probe would have passed into Shrapnell's cavity, whose extent would have been increased at the expense of the surrounding bony wall. If now the original communication between Shrapnell's cavity and the remainder of the tympanic cavity had become closed in the course of the disease by adhesions, cholesteatomatous masses, etc., the suppuration in the remainder of the cavity must have made itself a passage by perforating a new portion of the membrana tympani; then, besides the suppuration in Shrapnell's cavity, there would have been an apparently independent

suppuration in the remainder of the tympanic cavity, which would have escaped through the defect in the lower portion of the membrana tympani. Such a simultaneous appearance of two co-ordinated suppurations has been often reported, and I have observed it myself seven times. In other cases the suppuration in Shrapnell's membrane becomes chronic, but the communication with the remainder of the cavity continues open, and we have a clinical picture of which the following case is an example.

4. A boy, æt. thirteen, came to me January 6, 1890. He had suffered for five years with a discharge from the left ear, which had come on as an acute middle-ear suppuration in the course of a coryza, and had not been improved by repeated treatment. Apart from the offensiveness of the discharge and the deafness, he does not suffer particularly. The watch is heard at 30 *cm*, whispered words at $\frac{1}{2}$ *m*. The left external canal is plugged with cotton soaked in pus. The membrana tympani is thickened and shows extensive chalky deposits in its lower segment; it is covered with cholesteatomatous masses which are adherent above, and here there is a compressed but freely movable granulation mass. A bent probe can be passed by the granulations into the upper segment of the tympanic cavity. The granulations were cauterized with chromic acid, and injections of borax-water and instillations of boro-glycerine were ordered; the air douche was used daily. January 20th the suppuration had almost disappeared, the granulations were gone, and in the thickened and chalky membrana tympani a perforation of pin-head size was seen above and behind the processus brevis. Watch heard at 70 *cm*, whispered sounds the length of the room. January 30th the suppuration had ceased. The manubrium lay horizontal and was partly concealed behind the plica posterior; the perforation is dry but not closed.

In this case there was an open communication between Shrapnell's cavity and the remainder of the tympanic cavity. That there had been an inflammation in the tympanic cavity proper, which had run its course, follows from the pathological condition in which the lower portion of the membrana tympani was found; but while the inflammation

here had run its course, it continued unabated in Shrapnell's cavity, and only yielded to energetic local treatment.

Since in the four cases mentioned, there can be no doubt but that the inflammation in Shrapnell's cavity was of tubal origin, I am inclined, in opposition to Walb, to believe many cases to be caused in this way. In support of this view, I will give the ætiological factors of 27 cases of suppuration in Shrapnell's cavity from my own practice. These cases were observed in 34 individuals, 3 patients being affected in both ears. In 9 cases no immediate cause was discovered, in 5 individuals the affection came on in the course of an acute inflammation in the nose and naso-pharynx, and in 4 cases it began apparently as an acute middle-ear suppuration; 12 patients referred the beginning of the disease to childhood, but were unable to give the cause. The disease came on in 2 cases after scarlatina, and in 2 after a box on the ear.

In inquiring into the ætiology, it is striking that in a large percentage of the cases no definite ætiological factors are given. Only 38 per cent. of the patients were able to explain the manner in which the disease began. If these figures be compared with more extensive statistics of cases of middle-ear suppuration, this percentage is the more surprising. In the last three years I have seen 448 cases of chronic middle-ear suppuration; of these, 42 per cent. were unable to give a definite cause for the ear trouble. This shows that the frequent lack of an ætiological explanation of the suppuration in Shrapnell's cavity is no proof of the non-tubal origin of the disease. This lack is also due to the greater chronicity, together with the frequent disposition to a latent course. In my 21 cases in which no cause was assigned, the disease began in childhood in 12, and had lasted for a number of years in the other 10.

It will be seen from the figures that the disease is relatively more frequent in childhood, and this is perhaps due to the greater resistance which the membrana tympani possesses in childhood, and its greater ability to withstand the pressure of the purulent secretion. There being an increased resistance of the portion of the membrane below

the processus brevis, the greater relative frequency of perforation of Shrapnell's membrane in childhood is explained. It is also possible that the pus, encountering a greater resistance, attains a higher pressure in childhood, and more readily injects the fine mucous pouches in Shrapnell's cavity, which drain with difficulty, and this may be the reason why the disease has a greater tendency to localize itself to this region in childhood, and to become chronic.

The disease may undoubtedly arise from injurious influences in the external canal, but in these cases the fresh lesion must be seen before an injury coming from without can be considered the primary cause of the disease. That the suppuration in Shrapnell's membrane occurring after external injuries is, as a rule, secondary, follows from the fact that neither direct nor indirect ruptures occur in Shrapnell's membrane, but always in the other portions of the membrane, and chiefly in the posterior superior segment. I have never seen a fresh rupture of Shrapnell's membrane, nor has Politzer[1] or Schwartze.[2] It seems strange that Shrapnell's cavity should have such a tendency to isolated suppuration when the remainder of the cavity is not involved; it is not rare to have suppuration in Shrapnell's cavity with relatively good hearing, and the remainder of the membrana tympani of normal appearance. Since it was not easy to understand how the tympanic cavity, which serves as a passage for the pus, can recover with so few changes as it does in many cases, otologists were reserved about accepting the tubal origin of the disease. Walb then advanced the new theory that "in the great majority of cases" a disease of the external ear is the cause of the fistula in Shrapnell's membrane. Walb must believe one of two things, either that the infection occurs because Shrapnell's membrane is destroyed by a local purulent process in the external canal at the transition point between canal and membrane, or he considers a persistent foramen Rivini the channel through which the infecting material passes into Shrapnell's cavity.

---

[1] Politzer, Text-Book, 1878, p. 260, *et seq.*
[2] Schwartze, "Diseases of the Ear," 1885, p. 110.

The possibility of the correctness of the latter explanation depends on the possibility of proving the existence of a patulous foramen Rivini. Anatomists have differed on this point, and in the various works we find directly contrary opinions expressed. Koelliker,[1] Gruber,[2] and others recognize its existence, but not as a constant condition. Bochdalek,[3] in 1866, described an obliquely-running canal, which was at times in front of the processus brevis, and at times behind it. But it was questionable whether this were not artificial, since Bochdalek was only able to demonstrate the presence of the canal after long-continued probing with a fine brush. Schwalbe[4] passed a brush through the membrana flaccida three times in fifteen cases, but he does not consider this experiment convincing. Bezold[5] will not deny the possibility of small dry perforations being found in the upper portion of Shrapnell's membrane, but he doubts whether these are normal products, the more since he has never been able to find them in the new-born. My own investigations lead me to believe that no foramen Rivini exists normally, for in serial sections of the membrane at various ages I have found no trace of a patulous foramen.

If a simple microscopic examination of ear preparations is of little value in deciding this question, the otoscopic examination in the living is less so. For Shrapnell's membrane is so hidden, and has such a curved configuration, that when it is strongly illuminated the dark shadows may easily simulate a perforation when only a depression exists. It is this peculiarity in the form of Shrapnell's membrane that explains the frequent clinical error, for in sections of the membrana tympani *in situ*, striking the manubrium, a pocket-like depression is found in Shrapnell's membrane, so that the upper wall of the external canal passes over into the membrana flaccida under an obtuse angle, open upward (Fig. 1–4, p. 247). This condition is especially striking in

[1] Koelliker, Handbook of the Human Tissues.
[2] Gruber, Text-book, 1870, p. 91.
[3] Bochdalek, *Prager Vierteljahresschr. f. d. prak. Heilk.*, 1866, p. 32. For the earlier literature on this subject, see p. 40 of his paper.
[4] Schwalbe, "Anatomy of the Organs of Sense," 1877, p. 443.
[5] Bezold, *Zeitschrift f. Ohrenheilk.*, vol. xx., p. 21.

sections which pass through or a little behind the processus brevis, and in such circumstances it is easy to see how this pocket might simulate an opening when examined clinically. Wirtz's[1] description of foramini Rivini seen clinically suggests the possibility of such an error, especially when he says: "The foramen is frequently seen to be cleft-shaped, so that the convex arch of the cleft lies just in the bony margin." Probing alone can give convincing proof, although a patulous foramen should give a perforation sound. This is often wanting, however, according to Wirtz, and this excites the more suspicion that a shadow has been mistaken for a perforation. Wirtz adds that a shrill perforation sound is not unusual, but from Bezold's investigations, and from my own, we must conclude that the defect in these cases is of pathological origin. In these observations it is not stated whether the diagnosis was made by probing or producing a perforation sound, or whether it rested solely on what was seen through the speculum. Those cases excepted in which there is a pathological defect in Shrapnell's membrane, I am inclined to consider all normally existing foramini Rivini as the expression of an optical illusion. Zaufal[2] has recently expressed a similar opinion: "Walb believes that the microbes pass through the foramen Rivini to the mucous membrane lining the cavity about the malleo-incudal articulation, and produce an inflammation of the attic of the tympanic cavity; but the existence of such a foramen appears to me not proven, and his diagnosis does not seem unquestionable if made in life when deception is so easy." Again he says: "I believe that most cases of inflammation of the attic receive their microbes, like the inflammations of the tympanic cavity in general, through the tube.

While to my mind there is no probability of microbes entering the middle-ear through a patulous foramen Rivini, there is a possibility that a localized inflammation of the external canal which caused a solution of continuity in Shrapnell's membrane might permit the entrance of microbes into Shrapnell's cavity, and so produce a localized suppura-

[1] Über das Foramen Rivini, etc. *Inarg. Dissert. Oberhausen*, 1886, p. 6.
[2] Zaufal, *Medicinische Wander-Vorträge*, April, 1890, Paris 19 and 20, p. 7.

tion in this region. It should be said, however, that if a furuncular or eczematous otitis externa be considered an ætiological factor, a post hoc has been mistaken for a propter hoc. While furunculosis of the cartilaginous and of the most peripheral bony portion of the canal is of frequent occurrence in the course of an offensive middle-ear suppuration, I have never seen furuncular disease in the deeper portions of the bony canal. This depends on the anatomical relations of the bony canal, and on the pathology of furunculosis. While the lining of the cartilaginous canal is thick, cutis-like, and provided with hair follicles and wax-secreting glands, these are all wanting in the lining of the bony canal, which is thin, intimately connected with the periosteum, free from hair and glands, and in the neighborhood of the membrana tympani contains a series of slender vascular papillæ.[1] We must except a small triangular portion of the roof, that extends several millimetres in the bony canal, and is similar in composition to the cutis of the cartilaginous canal.[2] This portion does not reach as far as the membrana tympani, but stops at a greater or less distance from it, and in the immediate neighborhood of the membrane the lining is free from glands and intimately connected with the periosteum. As it is now proven that the furuncular affection follows the shaft of the hair, while the stratum corneum remains intact,[3] we can understand why furuncles do not develop in the deeper portions of the canal.

The case is otherwise with inflammations in the canal, caused by the pressure of foreign bodies which have lain long there producing abrasions and stagnation of the secretions. Here it is easy to understand how an undermining of the periosteal membrane may occur and through this a disturbance of nutrition in the underlying bony tissues and carious degeneration; in these cases the disease when it affects the margin of Shrapnell's membrane may destroy it, and thus open a passage for bacteria into Shrapnell's mem-

[1] Schwalbe, "Anatomy of the Organs of Sense," 1887, p. 437.
[2] Trölsch, "Anatomy of the Ear," 1861, p. 15-16. Politzer, Text-Book, p. 14.
[3] Schimmelbusch, "On the Cause of Furuncle." *Arch. f. Ohrenheilk.*, 1889, vol. xxvii., p. 252.

brane cavity. Of the foreign bodies which are especially liable to cause a circumscribed destructive inflammation in the neighborhood of Shrapnell's membrane I would mention plugs of cerumen, when accompanied by an exudative inflammation from whatever cause, or by an otomycosis. It is well-known that in such cases, after the plug has been removed, moist ulcerations are found in the bony canal, and it is not impossible that Shrapnell's membrane may be perforated; but I believe, on the other hand, that in most of these cases there is a merely superficial ulceration with hypertrophy of the numerous vascular papillæ found here, without further destruction. As a rule these granulations disappear as soon as the canal is thoroughly cleaned. At times simple washing out is sufficient to cause the granulations to disappear, again, it is necessary to use chromic acid or the galvano-cautery. Such cases are mentioned in literature, and Burnett[1] reports one in which a plug of cerumen had caused pain in the ear, and after its removal "an ulcerated spot was seen on the membrana flaccida, immediately above the short process of the malleus." In a week the ulceration healed and the ear was normal.

The following clinical history will show how careful one should be about accepting furunculosis of the external canal as a cause of perforation in Shrapnell's membrane.

5. A woman, æt. thirty-three, came to me August 28, 1890, complaining of pain in the right ear and right side of the head, without apparent cause; for some days there had been a slight purulent discharge. Watch heard at 5 *cm*, low conversation only very near the ear. The wall of the external canal is infiltrated and furuncular, and sensitive to the touch; no perforation sound. The infiltration prevents the examination of the deeper portions of the canal. The hearing of the left ear was almost entirely lost from an old middle-ear suppuration with caries and necrosis. September 2d, the infiltration of the canal was so much less that a small suppurating fistula could be seen above the processus brevis. The perforation is covered with granulations which are very sensitive to the touch. No perforation sound with catheterization. Each local treatment of the ear brings on a severe

[1] "The Ear," etc., Phila., 1877, p. 342.

attack of head-ache. Hearing of the right ear has been poor for years. November 8th, she was chloroformed and a large carious cavity filled with cholesteamatous masses, granulation tissue, and pus, was discovered between the wall of the canal and the membrana tympani. As the ear had been too sensitive to allow the introduction of Hartmann's canula I attempted to remove the malleus, but the neck broke off and only the manubrium came away; the carious cavity was then thoroughly scraped with the sharp spoon. The later treatment consisted in daily tubal injections and washing out the upper portion of the tympanic cavity with a Hartmann canula. December 11th, the suppuration had ceased and the membrana tympani was restored and partly adherent to the promontory. Upward and backward an opening passes to the carious cavity, which is cicatrized and quite dry. The headache is less violent and less frequent than before. The watch is heard at 25 *cm*, low voice at 1½ *m*. January 30, 1890, no suppuration and no headache.

If the patient had not explained that for years she had heard poorly with the ear, and if it had not been known that she always suffered with headache and dizziness after having the canal washed out, it might have been taken for granted that the infection had come from the external canal, if the extent of the carious process had not been discovered under chloroform. Similar to this was Hessler's[1] case, where a patient came on account of an acute furuncular affection of the canal, but the appearance of the ear indicated that the suppuration in Shrapnell's cavity had existed for years.

It is quite possible, as has been said, that the infection may come from the external canal; but here Shrapnell's membrane plays no more important rôle than the remainder of the membrana tympani, and the statement of Bezold,[2] that we are rarely able to demonstrate such a manner of infection for the remainder of the membrana tympani, holds in equal measure for Shrapnell's membrane.

And why should it be necessary to assume a different manner of development for inflammation in Shrapnell's

[1] *Arch. f. Ohrenh.*, xx., p. 218.
[2] *Zeitsch. f. Ohrenh.*, xx., p. 21.

membrane, than for that in the other forms of middle-ear inflammation? Do we not find that middle-ear inflammations, of whose tubal origin there can be no question, often limit themselves to particular portions of the middle-ear, *e. g.*, the antrum and the mastoid cells, and here run a chronic course, while the inflammation in the other parts ceases? The cause of this localization lies chiefly in the anatomical relations of the parts; the inflammation may limit itself to the mastoid cells, for example, because the drainage is poor on account of the form of the parts, and there is often retained secretion. Most frequently the middle-ear suppuration keeps pace with the inflammation in the mastoid process, although there are cases in which the inflammation in the tympanic cavity ceases, while the inflammation in the mastoid remains localized there. The following observation will illustrate this.[1]

6. A boy, æt. six, was brought to me August 4, 1886. Two months before, the existing affection began as an acute suppuration in the right ear with severe pain, which prevented him from sleeping. He was treated with injections of warm water and instillations of boro-glyceride. Occasional pain in and behind the ear. Ten days before the discharge became less, and the mastoid region became sore and swollen. There is considerable fever and the patient appears emaciated. The skin is dry and burning; the canal is dry; the membrana tympani is healed, but is lustreless; the posterior wall of the canal is swollen. The watch is heard at 1 *cm.* The auricle is very prominent because of a superficially fluctuating abscess in the mastoid region. The neck is stiff, the head turned to the right. August 14th the abscess was opened, and a quantity of pus evacuated. The abscess lay under the periosteum toward the anterior margin of the mastoid process; on a level with the upper wall of the canal was a carious portion which was scraped out with a sharp spoon, leaving a defect that would admit the tip of the little finger. The wound healed, and the patient was not seen further.

In this case the inflammation in the tympanic cavity ceased, and the membrane was healed and lustreless, while the secondary mastoid affection took on an independent

[1] This case is given in my paper, "Resectio processus mastoidei." *Nord. Med. Archiv*, vol. xx., No. 9.

character and necessitated operative interference. I have also seen cases in which suppurative middle-ear inflammation existed for some time without perforating the membrane, and where there was retention in the mastoid process. In two cases of this sort, which I shall give here, a paracentesis was first made, and then a mastoid operation.

7. H., æt. thirty-four, came to me July 5, 1887, with the statement that he had previously been well, and had had no signs of aural trouble until three months previously, when in the course of a coryza a severe pain came on in the right ear ; the pain was very severe for a week, no discharge. Since that time he has not felt well, and is feverish at times. Transient pains in the mastoid, continuous ringing in the ear, and hearing very much affected.

The patient is emaciated and pale. The mastoid region is sensitive to pressure, but the soft parts are not infiltrated. In the middle ear there is seen a translucent exudation. Paracentesis was made, and the purulent exudation evacuated. Leeches were ordered to the mastoid, and the ice-bag was used.

July 6th.—The pain had almost disappeared ; free discharge from the ear.

July 11th.—Patient feels well ; free secretion ; sleeps and eats well ; mastoid not sensitive.

July 13th.—pain for two hours in the mastoid. Redness and swelling of the bony canal. The perforation in the membrane being very small, was enlarged with the knife.

July 16th.—Pain again behind the ear, where the soft parts are swollen and œdematous. Free secretion. Evening temperature 38.4. Posterior wall of canal swollen and injected.

July 18th.—Under chloroform, an incision was made *1cm* behind the auricle, and the mastoid was opened with the chisel. Soft parts somewhat infiltrated.

	Temperature.	
	Morning.	Evening.
July 16th . . .	—	38.4
„ *17th* . . .	37.7	38.3
„ *18th* . . .	37.7	38.3
„ *19th* . . .	38.1	38.3
„ *20th* . . .	37.6	37.1
„ *21st* . . .	37.6	38
„ *22d* . . .	37.4	37.8
„ *23d* . . .	37.1	—

The mastoid was blue and cyanotic; bled freely. Thick pus and granulation tissue were found just below the thin cortical lamella. Since the walls of the cells were intact and showed no signs of softening, a considerable portion of the cortical substance was removed.

The wound healed well and the patient was discharged.

In a second case, a man æt. fifty-four who had suffered for three months with severe pain in the ear, which began in the course of a coryza, I found the canal dry, the membrana tympani tense and pushed forward by a purulent exudation. The mastoid remained sensitive in spite of a paracentesis, and it was finally necessary to make a mastoid operation. Pus and granulation tissue were found at a depth of 2½ *cm.* Injection did not show a communication between the tympanic cavity and the mastoid antrum.

There are besides these, numerous cases in which adhesions between the membrana tympani and the promontory isolate segments of the former, and these may become the seat of chronic suppuration while the remainder of the cavity remains uninvolved.

The normal anatomical relations of the mastoid process favor localized suppuration here, but the relations of Shrapnell's cavity are equally favorable. Shrapnell's cavity is a space of limited extent that is narrowed still more by the numerous mucous folds which pass from the head and neck of the malleus on the one hand, to the membrana flaccida and the tympanic portion of the upper wall of the canal on the other. Politzer has called attention to the smaller cavities so formed, and has pointed out their importance in pathological conditions, but Kretschmann who has recently studied the matter denies their importance and doubts their existence. Serial sections through the tympanum *in situ* have convinced me that this system of cavities really exists.

If we examine a series of frontal sections, passing from behind forward, in the posterior sections through the membrana tympani there will be found between the corpus incudis and the outer wall of the tympanic cavity, a large undivided space bounded inwardly by the incus and the lig. incudis (the fold that passes from the tegmen tympani to

the incus), and outwardly by the tympanic portion of the wall of the external canal. Following the sections forward,

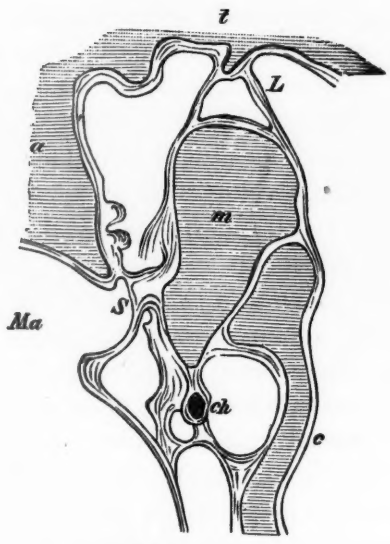


FIG. 1.

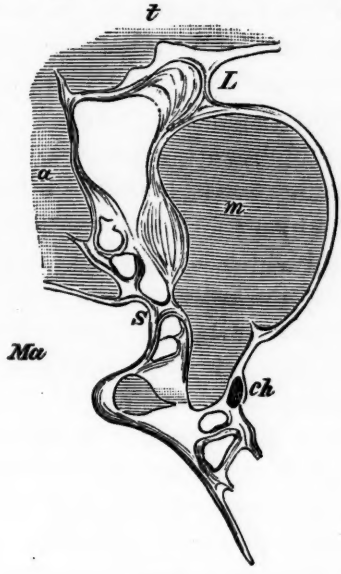


FIG. 2.

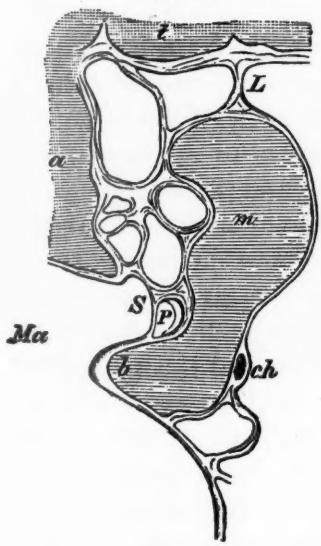


FIG. 3.

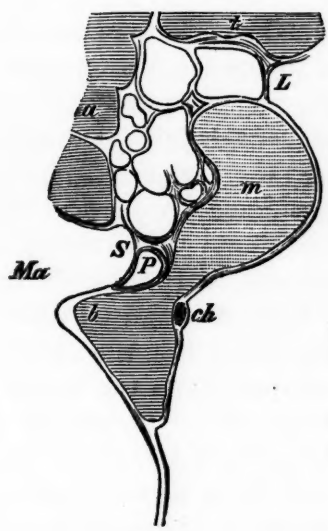


FIG. 4.

it is seen that this space is divided by a septum passing from the outer wall to the incus and crista mallei into an upper and a lower cavity. The junction of this fold with the

outer tympanic wall is anteriorly at the membrana flaccida, so that in sections that pass through the membrana flaccida (Figs. 1–4) the fold is seen to pass from the membrana flaccida midway between the processus brevis and the upper wall of the canal. This upper cavity corresponds to Kretschmann's "attic." The lower cavity, which is in communication posteriorly with the remainder of the tympanic cavity, is closed inferiorly near the crus longumincudis by a fold which contains the chorda tympani (Fig. 2, *ch*), and which is attached outwardly to the membrana flaccida and inwardly to the crus longum incudis.[1] Between the upper surface of the fold for the chorda, and the lower surface of the one mentioned above, stretching from Shrapnell's membrane to the incus and malleus, there is a cavity which continues forward above the processus brevis forming the so-called Prussak's space. Prussak's space extends forward generally as a single undivided antrum, which gradually assumes a pear shape and ends blindly near the processus brevis; in some cases, however, there are folds stretched through the space from Shrapnell's membrane to the neck of the malleus (Fig. 2). It is different with the large cavity which lies above the external fold of the malleus and incus. So far as this cavity belongs to the malleus, it is divided into a great number of spaces of irregular form, which communicate in part, and in part, especially posteriorly, open into the great undivided cavity between the lateral wall of the tympanic cavity and the incus. If the portion of the middle ear lying in the mastoid process be compared with that portion beyond the malleus and incus, the large posterior cavity would correspond to the mastoid antrum, while the entire system of cavities into which the large cavity breaks up anteriorly and which lies chiefly between the head of the malleus, the membrana flaccida and the tympanic portion of the roof of the external canal, would be the analogue of the mastoid cells. For short, I shall call the first portion: antrum Shrapnelli, and the latter portion: cellulæ Shrapnelli; Prussak's space may be considered to be included in the latter.

[1] Brunner—Contributions to Anatomy and Histology of the Middle Ear. Leipzig, 1870. Plate III.

I have found this system of cavities to be of much greater extent than Politzer supposed. In one preparation the whole cavity from the processus brevis to the tegmen tympani is divided into little spaces. The spaces contain air and are lined with epithelium; although as the folds cross in every direction, some cavities give the impression of being filled with connective tissue.

This fine-meshed system of cavities gives us the key to the understanding of the diseases of this section of the tympanic cavity; and I must say, in opposition to Kretschmann, that they are of the utmost importance in the suppurations occurring here. Just as the mastoid cells are often, from their structure, the seat of retained inflammatory secretions, so Shrapnell's cells, because of their small size and imperfect drainage, also become inflamed from retention.

The acute retention attacks in the mastoid have a severe and protracted course from the pressure that the secretion undergoes, enclosed by the bony walls, but the course of an acute inflammation in Shrapnell's cells is milder and more transient, since the secretion may distend the yielding walls, and, when it becomes necessary, easily perforate Shrapnell's membrane. If the whole attic were a large continuous cavity, primary retention of inflammatory secretion would hardly occur, as the cavity opens posteriorly into the general cavity of the tympanum; but in Shrapnell's cells, on the contrary, such retention is easy. In accordance with this, it is found that it is particularly the anterior portion of Shrapnell's membrane that bulges in acute inflammations of this part, while the posterior portion, belonging to Shrapnell's antrum, is but slightly prominent. If perforation occurs it also is in the anterior half (just above and before the processus brevis), while I do not now remember to have seen a perforation in the posterior portion of the membrane. The case is otherwise with chronic inflammations in this region, for then the destructive process spreads and the posterior portion of Shrapnell's membrane may be involved; but this is to be considered the expression of a secondary process. The fact that the perforation is in most cases a short distance from the processus brevis and above it would indicate

that retention is more frequent in the upper segment of Shrapnell's cells than in Prussak's space proper. The perforation may, however, lie close to the processus brevis and above it, a condition which can only be explained by retention in Prussak's space. It is clear that Prussak's space, a single tubular cavity with smooth walls, would be the seat of retention much less frequently than Shrapnell's cells. But here also it would appear that individual peculiarities may alter the case, as Prussak's space in some specimens is crossed by folds, which of course favor retention of secretion.

When the inflammation has existed for some time the disease spreads over the region of Shrapnell's cells and the entire attic or portions of it are involved. The destruction does not limit itself to the system of folds, but attacks the ossicles and particularly the malleus and the tympanic portion of the roof of the canal. In this manner the inflammation spreads and perforates the medial wall of Shrapnell's cavity, and the disease comes to be in the medial portion of the upper segment of the tympanic cavity (Hartmann's "cupola"). This segment may be in communication with the remainder of the tympanic cavity, or secondary adhesions may exist separating the cupola from the cavity proper. Hartmann[1] has described five temporal bones in which the cupola was entirely separated from the remainder of the cavity by pathological septa extending from the promontory to the malleus and incus, and from here to the outer wall of the tympanum.

A long-continued suppuration may, however, remain limited to Shrapnell's cells without causing extensive destruction, and certainly every aurist sees patients who come for treatment after having suffered years with ear diseases which have caused them little annoyance, and examination shows a small perforation above the processus brevis, through which the probe passes into a cavity a few millimeters deep, usually filled with pus and cholesteatomatous masses.

The reason for this chronicity of Shrapnell's suppuration does not lie in the anatomical relations of this region, but in

[1] *Deutsche med. Wochenschr.*, 1868, No. 45.

the fact that the disease is often accompanied with a desquamative process by which the pus cavity is filled with cholesteatomatous masses. These retard drainage and erode the surrounding walls. This desquamative condition may exist in different degrees, and may vary from the casting off of a few epithelial scales that may be easily removed with the rest of the secretion, to the formation of large coherent masses that fill the entire tympanic cavity and the mastoid antrum. The antrum and the mastoid cells were formerly considered the principal seats of cholesteatoma formation, but experience has shown that suppuration in Shrapnell's region is frequently accompanied with cholesteatoma formation. Bezold [1] said that all the cases of chronic middle-ear suppuration with perforation of Shrapnell's membrane that he had seen showed epithelial desquamative masses in the middle ear. In thirty-seven cases of which I have notes the formation of cholesteatoma was found thirteen times.

In some cases the cholesteatoma forms a dense pointed plug, with its base in the perforation and its apex projecting into the tympanic cavity. At first glance it would seem that there was a plug of cerumen on Shrapnell's membrane, but after it is removed there is seen to be a long projection, which may adhere tightly to the surrounding parts.

In other cases, where the pressure of the cholesteatoma has eroded the walls, an immense mass may be seen not only filling the upper segment of the tympanic cavity, but also extending into the mastoid antrum and the neighboring portion of the mastoid process.

8. A man, æt. fifty, came to me January 9, 1890. Hearing has never been good, and the left ear has discharged at times. Following an attack of influenza, the condition of the ear became worse ten days previously. The canal is filled with pus and disquamative masses. Watch heard at 2 *cm;* whisper at 20 *cm.* After daily injections and instillations of boro-glyceride the suppuration had almost ceased January 14th. In the anterior inferior segment there is a dry round perforation. The whole posterior superior segment and Shrapnell's membrane are destroyed, and

[1] *Zeitschr. f. Ohrenhk.*, vol. xx., p. 8.

the entire defect filled with dense pearly cholesteatomatous masses which send out prolongations upward into the superior segment of the cavity, and posteriorly into the antrum.

The masses were gradually removed with forceps and Hartmann's canula. Through the large defect is seen, upward and backward, a large cavity lined with shining epithelial tissue, composed partly of the cupola and partly of the antrum. The incus is wanting. The manubrium is present. There was not much functional improvement. The patient's head, however, felt lighter after the removal of the masses.

In some other cases the pus from the middle ear contained small epithelial scales without the peculiar cholesteatomatous masses.

The pathogenesis of cholesteatoma has been much discussed of late years, without any very clear conclusions being reached. Virchow showed that cholesteatoma consisted of nucleated polyhedral cells larger than the epithelial cells of the tympanic mucous membrane; between these cells lie cholesterine crystals. Virchow's idea[1] that cholesteatoma was an actual neoplasm is now generally given up. They almost always occur in connection with inflammation of the middle ear, and are seldom seen independently (Lucae[2] and Wendt[3]). Böttcher[4] supposes that cholesteatoma has its primary origin in the labyrinth, and may then develop from the epithelium of the aqueductus vestibuli, a supposition which Schwartze,[5] on clinical grounds, regards as correct.

While Kuhn[6] follows Virchow in regarding cholesteatoma a true tumor, most investigators regard it as the expression of an inflammatory process. Wendt[7] calls this "a desquamative inflammation," which causes a continuous casting-off of epithelium, which collects in the middle ear, and if the con-

[1] *Virchow's Archiv*, vol. viii., 1855; *Berliner klin. Wochenschr.*, 1889, Nos. 10 and 11.

[2] Lucae, "Contribution to the Study of Cholesteatoma of the Petrous Portion of the Temporal Bone," *Arch. f. Ohrenh.*, vol. vii., p. 258.

[3] Wendt, *Arch. f. Heilkunde*, vol. xiv.

[4] Böttcher, *Arch. f. Anal. und Phys.*, part iii., 1869.

[5] Schwartze, *l. c.*, p. 221.

[6] Kuhn, *Arch. f. Ohrenh.*, vol. xxvi., p. 63.

[7] Wendt, *Arch. f. Ohrenh.*, vol. viii., p. 215., "Verhandl. der 46. Naturforscher. Versammlung," 1883.

ditions are not favorable for its escape, gradually fills the tympanic cavity. Lucae[1] supports this view. "It is easy to conceive that in purulent granular inflammation of the middle ear, in circumstances which are as yet unknown to us, a proliferation of epithelium may occur in the granulations, and the cast-off layers gradually collect in the cavity and finally form a cholesteatoma."

This epidermic transformation was demonstrated later by Steinbrügge,[2] Schwartze, and others, and is to-day generally accepted. Another question is how this degeneration proceeds. Bezold[3] believes that the epidermis of the canal grows through the defect in the membrana tympani. In cases of marginal perforation, the portions of mucous membrane near the annulus tympanicus undergo a transformation, the cutis developing at the expense of the mucosa; if the membrana tympani be destroyed to a greater extent and the malleus handle be drawn so far inward that the point becomes adherent to the promontory, the epidermoidal proliferation begins at the point of contact. This migration of cutis may often be assisted by the presence of duplicatures of mucous membrane stretching across the cavity, and thus be conducted to distant parts as, for example, the mastoid cells or antrum.

Habermann[4] reported a case of this sort, and with Bezold considers an epidermoidal migration, beginning in the external canal, as the underlying condition of cholesteatoma. Walb and Steinbrügge agree with Habermann, but Kuhn speaks of cases in which isolated cholesteatomatous masses are found in the intact mastoid cells, and he agrees with Virchow, while Barth, on the contrary, regards cholesteatoma as beginning in the degeneration of the mucous membrane.

The transmigration theory is at first glance attractive, but we look in vain for analogies in other parts of the body. So far as I know, no case of extensive migration of epidermis, at a point where epidermis and mucosa meet, has been

[1] Lucae, *Zeitschr. f. Ohrenh.*, vol. viii., p. 224.
[2] Steinbrügge, *Zeitschr. f. Ohrenheilk.*, vol. viii., p. 224.
[3] Bezold, *Zeitschr. f. Ohrenheilk.*, vol. xx., p. 5.
[4] *Archiv. f. Ohrenh.*, xxvii., p. 42.

observed elsewhere. There are, on the contrary, many examples of metaplastic changes in the mucous membrane of cavities which are the seat of chronic purulent inflammation, and a tissue purely mucus, comes to have a typical epidermoid character and a rete Malpighii. There are further examples of the casting-off of these transformed membranes, which then become mingled with the purulent secretion, and a product is formed similar to the cholesteatomatous masses in chronic suppuration of the middle ear. Ozæna simplex is an example of this.

In 1882, Volkmann[1] removed great pieces of the turbinated bones in patients suffering with ozæna simplex, and found that the ciliated cylindrical epithelium of the nasal mucous membrane had been transformed into pavement epithelium. Krause[2] and Fraenkel[3] have made similar observations. K. Schuchardt[4] published a year ago some investigations on the metaplastic changes in the epithelium of the nasal cavities in ozæna simplex. He examined bits of mucous membrane which had been removed from the upper portion of the nasal cavity with the sharp spoon (Figs. 5 and 6).

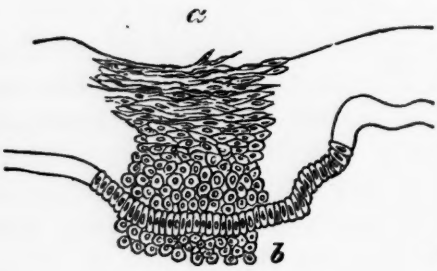


FIG. 5.

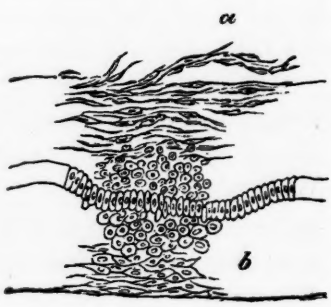


FIG. 6.

In place of the ciliated cylindrical cells, he found a laminated pavement epithelium, the superficial cells horny, and becoming loosened from the lower layers. I have often had the opportunity of studying this condition in prepara-

[1] Volkmann, *Centralb. f. Chirg.*, 1882, No. 5.
[2] Krause, *Virchow's Archiv*, vol. lxxxv., p. 325–343, 1881.
[3] E. Fraenkel, *Virchow's Archiv*, vol. lxxxvii., p. 285, 1882.
[4] K. Schuchardt, "Volkmann's Sam. klin. Vorträge," 1889, No. 340, p. 3233.

tions of the mucous membrane from the middle turbinated bone in ozæna patients, and I have found the ciliated cylindrical epithelial cells transformed into a laminated pavement epithelium with an underlying rete Malpighii (Fig. 5). If we examine sections of the membranes lining the cavities of the temporal bone, which are filled with cholesteatomatous masses (Fig. 6), we get a similar picture, in that the cavity is lined with a laminated pavement epithelium having beneath it a rete Malpighii. If a comparison be made between the secretion in ozæna simplex and the cholesteatomatous middle-ear secretion, it will be seen that the morphological elements are identical.

A migration of the epidermoid layers of the cutis does not take place in the nose in ozæna simplex, nor does a solution of continuity exist at the margin between cutis and mucosa —a necessary condition for such a migration in Bezold's sense.

It therefore appears more probable that the anatomical conditions found in ozæna simplex and desquamative middle-ear suppuration are the result of the mechanical pressure of the exudation upon the underlying epithelium. It is well known that a cylindrical epithelium, when long subjected to mechanical insult, will assume an epidermoid character (Billroth[1]). The ciliated cylindrical epithelium of the nasal cavity and of other parts become transformed into pavement epithelium in the course of protracted purulent catarrh, and the exfoliation of its superficial elements and their mingling in the secretion gives this latter a peculiar character, and such are the conditions met with in chronic middle-ear suppuration. Whenever the conditions are less favorable for drainage, and the pressure of stagnating secretion is greater, the metaplasia is found with a consecutive desquamative process.

It is especially in the antrum and the mastoid cells, as well as in Shrapnell's cavity, that conditions particularly unfavorable for drainage are found, and, in accordance with this, the formation of cholesteatoma goes here hand in hand with suppuration. It goes without saying that any portion

[1] Billroth, *Deutsche Klinik*, 1885, p. 497.

of the middle ear may become the seat of this metaplastic process, if it be long enough subjected to the action of an offensive purulent secretion, and it is natural, therefore, that these metaplastic changes in the epithelium should be found at the junction of canal and tympanum, as well as in the deeper portions of the tympanic cavity, and these parts which are continuously subjected to the metaplastic action of the secretion may become changed, without it being necessary to consider the condition one of "epidermic transmigration."

Explanation of the Figures.

Fig. 1–4 represent four successive frontal sections of the tympanic cavity of a boy, aged four.

The section in Fig. 1 is the posterior one, while Fig. 4 represents a section through the tip of the processus brevis.

Fig. 1 shows a single large cavity between the head of the malleus and the external wall of the tympanum, with mere suggestions of spaces in the floor at S ; but the condition changes as we go farther forward, and Fig. 4 shows the entire cavity subdivided.

a—outer wall of the tympanic cavity.
t—tegmen tympani.
Ma—meatus aud. externus.
S—Shrapnell's membrane.
m—head of malleus.
c—crus longum incudis.
L—superior ligament of malleus.
Ch—chorda tympani.
P—Prussak's space.

Fig. 5. Section of nasal mucous membrane in ozæna simplex.
a—surface of the mucous membrane.
b—subepithelial layer.

Fig. 6. Section of the lining membrane of a cholesteatomatous cavity in the mastoid process.
a—surface toward the cholesteatoma.
b—periosteal layer.

REMOVAL OF A REVOLVER-BULLET FROM THE TEMPORAL BONE BY THE USE OF THE CHISEL. RECOVERY, WITH PRESERVATION OF HEARING.

By OSCAR WOLF, Frankfurt-on-the-Maine.

Translated by Charles H. May, M.D., New York.

I AM prompted to publish the following short paper by perusal of the history of bullet-wound of the ear, which appeared in the *Archiv für Ohrenheilkunde* (Bd. xxx., S. 165). The case terminated fatally after three months and a half,[1] no operation having been performed. I believe this paper to be entitled to general interest, because not only was the life of the patient saved, but hearing in the affected ear was regained.

In all cases of bullet-wound of the ear previously published, and tabulated by Schwartze ("Chirurg. Krankheiten des Ohres," S. 358), hearing was lost; in fact, there are very few cases which did not terminate fatally. In this connection Schwartze (*l. c.*) says: "Bullet-wounds of the ear are almost always fatal. Those which have not proved so have been mere exceptions. There is danger of purulent erosion of the carotid when the bullet has become lodged in the temporal bone; death may also ensue after years as a result of purulent meningitis."

E. L., aged seventeen, was seriously wounded October 15, 1889, by a revolver discharged near by, the bullet entering the right ear. She fell, but preserved consciousness and was able to get

[1] Thiéry, Schuss in's Ohr, eine Verletzung des inneren Ohres herbeiführend. *Bulletin de la Société anatomique de Paris*, Mai, 1888, S. 528 u. ff.

up soon after. There was but little hemorrhage from the ear, and not much from the wound. According to the attending physician, Dr. Ebenau, moderate facial paralysis developed on the eighth day, and there was a slight purulent discharge from the external auditory canal. Two weeks after the injury I was called in consultation, and found the following condition :

The bullet had entered just in the front of the tragus, had crossed the external auditory canal obliquely, penetrated the posterior wall near the *Mt*, and had become lodged in the substance of the temporal bone. Illumination merely revealed the swollen and torn canal; *Mt* could not be seen distinctly. The bullet could not be detected with Nelaton's porcelain probe; only the hard, exposed bone of the posterior wall of the canal was encountered. There was moderate facial paresis ; the lower lid did not close completely, and the right angle of the mouth drooped somewhat. There was neither vertigo, headache, tinnitus, nor vomiting. Deafness on the affected side was incomplete; the watch was heard at *2 cm*, and whispering near the ear.

The questions which presented themselves were : " Where was the bullet lodged ? " and " Should the latter be removed by operative interference ? "

It was not likely that the bullet was lodged in the tympanum, because the injury which this would have done to the chain of ossicles and the pressure which it would have produced upon the fenestræ would, in all probability, have occasioned much greater disturbance of hearing, attacks of vertigo, and severe subjective noises. On the other hand, the unmistakable paresis of the facial pointed to the seat of the bullet in the neighborhood of the Fallopian canal—between the carotid, sinus, and middle fossa—a region which was not very inviting for operating.

Taking into consideration the statistics just given in cases which were not operated upon, I felt that there was more danger in waiting than in operating. Besides there was a possibility that the facial paresis would disappear after extraction of the bullet.

I operated November 2d (sixteen days after the injury). I had had a small bullet-forceps constructed, bent at an angle like aural forceps.

The auricle was separated posteriorly and pushed forward ; the periosteum of the bony auditory canal was loosened, and the posterior wall of the canal chiselled away. The bone was very hard, so that this stage of the operation proceeded very slowly.

The apparent course of the bullet necessitated chiselling in a backward direction. Constant oozing of blood from the blood-vessels of the bone interfered with the view of the bottom of the canal which had been made with the chisel; after this canal had reached a depth of 1½ *cm*, the porcelain-tipped probe not yet showing the location of the bullet and the operation having lasted almost an hour and a half, we concluded to continue the operation after the lapse of forty-eight hours, hoping that the canal would then be dryer and the view less obstructed.

The operation was continued November 4th. After removing the bandage, I obtained a good view of the depth of canal, and after illumination, saw a small, shining, metallic point which left a lead discoloration upon the porcelain-tipped probe. I tried to chisel away the bone from around the bullet, so as to loosen it, but removal was very difficult on account of the change in form to an irregular mass of lead, as though cast into the osseous cells. Finally it was loosened with the forceps described above, separated by chiselling all around it and extracted with a dressing-forceps. After disinfecting the chiselled canal, it was seen that the bullet had rested directly upon the sinus, for the bluish wall of the latter could be distinguished.

The auricle was reattached, the lower end of the wound being left open. The subsequent course was favorable; there was slight elevation of temperature at night after several days, dependent upon slight sloughing of the auricle which had suffered in its nutrition as a result of the operation, so that there was some atrophy of the upper portion.

After three weeks, faradization of the facial was begun, and caused a gradual improvement. The bony canal became pervious again, so that the *Mt*, now normal, could again be seen. The hearing-distance of the right ear was normal. After five months the slightly atrophied auricle served as the only external evidence of the severe injury, and of the perilous extraction of the bullet.

The course of the operation and the location of the bullet explain the complete recovery of hearing. The bullet had passed close to the *Mt*, going obliquely backward; the resulting myringitis had caused a moderate diminution in the hearing distance, but had passed away in a short time without leaving any residue. During the operation, no im-

portant parts concerned in hearing were injured. The canal which was chiselled in the bone was located close behind the annulus tympanicus, so that the various parts of the tympanum and the semicircular canals remained intact. The facial nerve also seems merely to have been pressed upon, and not torn by the bullet. The occurrence of facial paresis only after several days was due to a neuritis from pressure; after removal of the bullet, and the use of the constant current, the neuritis subsided so that the nerve was again capable of conduction.

EMBRYO OXYURIS IN THE NOSE.

By THEODORE PROSKAUER.

ASSISTANT AT THE OPHTHALMIC AND AURAL CLINIC OF DR. SCHUBERT IN NÜRNBURG.

(With Three Illustrations.)

Translated by CHARLES H. MAY, M.D., New York.

THE only kinds of animal parasites which have been found in the human nose, excepting the larvæ of flies, have been various varieties of worms. According to Tiedemann,[1] Mackenzie,[2] Schech,[3] and Moldenhauer,[4] ascarides, maggots, centipedes, earwigs, and pentastoma have occasionally been found. However, in every case, they were macroscopical, full-grown animals, which wandered from their accidental resting-place or were removed forcibly after having given rise to more or less severe irritation.

I was fortunate enough to discover microscopically minute worms in a patient's nose.

A female patient, thirty years old, complaining of neuralgia of the forehead and inner portion of the right eyelids, presented herself at the office of Dr. Schubert, who has kindly permitted me to publish her case. Examination of the nose revealed a deposit upon the right inferior somewhat hypertrophied turbinated body. I removed the deposit in order to examine it microscopically in glycerine. In the mucus there was a large number of very minute particles; with one exception these were

[1] Von den lebenden Würmern und Insekten in den Geruchsorganen des Menschen.
[2] Die Krankheiten des Halses und der Nase.
[3] Die Krankheiten der Mundhöhle, des Rachens und der Nase.
[4] Die Krankheiten der Nasenhöhlen.

found to consist of snuff. The exceptional particle, distinguished from the rest by its grayish-white color, gave an unexpected picture under the microscope. Through a homogeneous envelope, more or less twisted, granular, entwined forms were seen, without any distinguishable detail. After careful teasing, two different component portions could be distinguished; a number of scale-like formations, and from fifteen to twenty very small worms. The latter were about equal in size, 0.3—0.4 *mm* in length, and varying in breadth at different parts from 0.01 to 0.04 *mm;* one extremity was broad, the other pointed; within their thin, homegeneous envelope with double contour bent here and there, were granular contents; a tube could only be demonstrated and followed from the broad end corresponding to the opening of the mouth. 0.01 *mm* behind this spot it enlarged, became spindle-shaped, and at a distance of 0.03 *mm* it became narrow again. No other organs could be distinguished. They had been immersed in glycerine for twenty-four hours, so that spontaneous motion could no longer be demonstrated. I have endeavored to sketch one of them, magnified 100 diameters (Fig. 1); in two places the envelope burst in embedding, and some of the contents escaped. When I examined the animals in a fresh condition they were well preserved.

FIG. 1.

FIGS. 2 AND 3.

The next question was as to the species of the worm. A zoölogist of reputation pronounced them oxyuris vermicularis, and, as a matter of fact, they resembled the young forms of oxyuris which Leuckart[1] pictures. The size and embryonal character of the specimens before me indicated that they were undeveloped and could not have lived long. Leuckart, who describes the development of the oxyuris in detail, says that first there is formed a river bull-head shaped embryo, which changes to an elongated form with a pointed

[1] Die menschlichen Parasiten und die von ihnen herrührenden Krankheiten, Bd. ii., S. 328.

posterior extremity; this, as far as external appearances go, resembles the full-grown female, but no genital organs can be distinguished at this stage. This form the embryo persists in for a time after the rupture of the membranes; it simply increases in length from 0.14 *mm* at birth until it is 1.5 *mm* long. When it has acquired this length, it becomes covered with an integument and the genital organs develop; the female retains this same form and acquires a length of 10 *mm;* the male is only 4 *mm* long and terminates abruptly. The smallest embryo which Leuckart discovered free in the contents of the intestine was 1.5 *mm* long; Vix claims to have seen some 0.2 — 2.0 *mm* long in the intestines. Hence the worms which we are writing about were found in a very early state of development, very rarely observed, and probably never before seen outside of the intestines.

Full-grown, sexually-developed, emigrant oxyures and eggs containing embryos are very frequently found in the neighborhood of the anus; and very likely these eggs are carried to the mouth by dirty hands, so that they continue their wanderings in this channel of the same or some other host. Full-grown oxyures have also been found in the nose; only recently, Hartmann [1] reported such a case. However, how do embryos which have been developed for some time happen to be found in the nose? Could they have escaped through the action of the gastric juice upon the membrane and have developed afterward? We need not discard this theory when we remember that occasionally undeveloped animals leave the large intestine, and that these may then be carried to other parts. This supposition is supported by the fact that they were found in one mass. As regards the extraordinarily numerous scales, I cannot advance any explanation; I am content to report that they were colorless, striped slightly, 0.005 – 0.01 *mm* broad, and 0.06 – 0.08 *mm* long. Accompanying is an illustration of two of them (Figs. 2 and 3). I need not add that what I found was merely an accidental discovery without practical significance.

[1] Bericht über die Verhandlungen der otolog. Sect. der 61. Versannel. deutscher Naturforscher und Aerzte.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF THE YEAR 1890.[1]

II.—PATHOLOGY AND THERAPEUTICS.

(Concluded from page 188.)

By A. HARTMANN, Berlin.

Translated by Dr. Max Toeplitz, New York.

MIDDLE EAR.

56. Zaufal, Prof. E. Contribution to the treatment of acute otitis with reference to the results of bacteriological investigation. *Prager med. Wochenschr.*, 1890, Nos. 4, 5, and 6.

57. Buck, A. H. Brief memoranda in practical otology. *N. Y. Medical Record*, November 9, 1890.

58. Todd, Chas. A. Aneurism first recognized in the fundus of the ear, later appearing in the neck. *Trans. Amer. Otol. Soc.*, 1890.

59. Randall, B. A. Further notes on Schrapnell's perforation. *Trans. Amer. Otol. Soc.*, 1890.

60. Ludewig. Caries and extraction of the incus; contribution to the etiology and therapeutics of chronic suppuration of the middle ear. *Arch. f. Ohrenheilk.*, vol. xxix., p. 242.

61. Randall, B. A. Suppuration of the tympanic attic and perforation of Schrapnell's membrane. *Medical News*, September 27, 1890.

62. Burnett, C. H. Permanently good results of excision of the membrana tympani and malleus in a case of chronic aural

[1] For the American otological literature this report takes in also the second half of 1890.

vertigo; also in a case of chronic suppuration of the tympanic attic. *Trans. Amer. Otol. Soc.*, 1890.

63. HEPBURN, H. J. Report of a case of fracture of the malleus handle with luxation at the incudo-stapedial joint. *Trans. Amer. Otol. Soc.*, 1890.

64. BORNBONE, TOMMASO. San Remo. Different forms of purulent tubercular otitis media.

65. ARBUTHNOT-LANE, W. The treatment of pyæmia consequent upon disease of the middle ear unassociated with thrombosis of the lateral sinus. *Brit. Med. Jour.*, June 28, 1890.

66. TOTI, ADDEO. Resection of the apophysis of the mastoid in a case of the form as described by BEZOLD, etc. (Resezione dell' apofizi mastoide in un caso della forma descritta da Bezold, etc.) *Accad. med. fir. di Firenze*, June 28, 1890.

67. BRAUN. Successful trephining in cerebral abscess following otorrhœa. *Arch. f. Ohrenheilk.*, vol. xxix., p. 161.

68. RICHARDS, HUNTINGTON. Mastoid sclerosis as illustrated by a very typical and fatal case. *Trans. Amer. Otol. Soc.*, 1890.

69. POMEROY, O. D. Four cases of mastoid cell disease cured by Wilde's incision and proper antiseptic dressing. *Trans. Amer. Otol. Soc.*, 1890.

70. LIPPINCOTT, J. A. Mastoiditis interna purulenta following erysipelas. *Medical News*, October 11, 1890, and *Trans. Amer. Otol. Soc.*, 1890.

71. GREEN, J. ORNE. The treatment of inflammation of the mastoid. *Amer. Jour. of Med. Sciences*, December, 1890.

72. TILLEY, ROBERT. Four cases of disease of the mastoid. *Medical News*, August 30, 1890.

73. SABOURAND, M. Caries of the temporal bone. Ulceration of the carotid. (Carie du rocher. Ulcération de la carotide.) *Soc. Anat. Séance*, October 10, 1890.

74. SCHWARTZE. Twenty-eight cases of fatal diseases of the ear, with conclusions upon the treatment and fitness for military service in aural affections. *Deutsche Militärärztl. Zeitschr.*, 1890.

75. BRONNER, ADOLF, Bradford. Massage of the membrana tympani and the ossicula in the treatment of chronic catarrh of the middle ear. *Brit. Med. Jour.*, May 27, 1890.

76. FERRERI, GHERARDO. Result of histological examinations of polypi of the middle ear.

77. HAUG. Case of sarcoma of the tympanic cavity and of the mastoid process. *Arch. f. Ohrenheilk.*, vol. xxx., p. 126.

78. SCHWABACH, Berlin. Symptoms of intoxication after injections of sol. cocaini muriatici into the tympanic capity. *Therapeutische Monatshefte*, 1890, No. 3.

79. BAUMGARTEN, E., Budapest. Advantages and disadvantages of treating the ear with cocaine. *Monatschr. f. Ohrenheilk.*, etc., 1890, No. 2.

56. The principles laid down by ZAUFAL for the treatment of otitis media acuta are as follows: "(1) Relief of the most unpleasant subjective symptoms; (2) strict attention has to be paid not to disturb the normal course of development of the primary agent of inflammation, uninfluenced by the interference of other pathogenic microbes, until the primary agent has died out. This ought not to prevent (3) the application of remedies which accelerate the course of development in an uninjurious manner, and which remove the products of inflammation together with the micro-parasites as speedily as possible from the seat of inflammation and make them incapable of living; (4) for restoration of the full functions, operative procedures." Zaufal does not prescribe antipyretics, since the fever forms an indication for paracentesis. Pain is relieved by hot poultices of aluminium aceticum; ear baths with Burow's solution or sublimate (1:1000) are also used. When the epidermis is imbued with moisture, instillations of cocaine (5–10 %) are beneficial. In the beginning of an acute otitis media the external meatus and the auricle should be disinfected and kept antiseptical (brushing with soap-water, irrigations with solutions of sublimate, 1:1000). The air douche should not be applied before the violent inflammatory phenomena have subsided. Massage may be used in addition.

57. BUCK relates two cases: *a.* That of a lady who had had a discharge from the right ear for many years, more profuse at times than at others. Her hearing power in that ear varied very greatly, and that without any assignable cause; the other ear was practically useless. Membrana tympani seemed regular, except that, on close examination, a suspiciously soft spot was felt with the probe at the posterior superior quadrant. On further trial with the probe, a perforation was found to exist at that

point and the cavity beyond—that is, the entrance to the mastoid antrum and the depression at the oval window—was found filled with granulations. As soon as these granulations were pushed back and an opening into the tympanum cleared, she heard well. The granulations were reduced by applications of nitrate of silver, and the patient was enabled to hear well continuously. The incus, it seems, was absent, and the mass of granulations stood in the way of a direct impact of the sound waves to the stirrup.

The second case was that of a young man suffering from naso-pharyngeal catarrh with a sense of fullness in the ears, which was increased by the pressure of his steel spectacle bows on the mastoid, and some hardness of hearing. The patient considered malarial poisoning at the bottom of his trouble, took ninety grains of quinine, and was relieved of his troublesome symptoms.

SWAN M. BURNETT.

58. In TODD'S patient there was a history of purulent otitis in 1858, with remaining hardness of hearing. There has been a pulsating sound in the left ear for seven or eight years. On inspection, a red soft tumor which did not pulsate was found on the floor of the meatus in front of the drumhead. It was incised, the hemorrhage was profuse and had to be stopped by the tampon. It was not reduced in size, and later an aneurism appeared in the neck below. No further history. SWAN M. BURNETT.

59. RANDALL still contends for the greater frequency of "attic" disease than is usually conceded. In his last 500 ear cases he saw 15 of attic inflammation. He gives the histories, with drawings, of some 28 cases. In treatment he considers the intratympanic syringe the most reliable and efficient. He has never yet done an excision, but may do so in certain cases.

SWAN M. BURNETT.

60. LUDEWIG demonstrates in this paper the frequency of caries of the incus, and emphasizes on account of numerous histories of cases the necessity of extraction of the incus in certain cases of chronic suppuration of the middle ear. He found that after excision of the malleus the suppuration is frequently kept up by the carious incus, and, therefore, he performs always the extraction of the incus in addition to the removal of the carious malleus. The instruments devised by Kretschmann and Ferrer for this purpose not being satisfactory, he devised a novel instrument, which, however, "did not suit him for all cases. Ludewig's instrument, like that of Kretschmann, is a hook, which has to dis-

locate the incus into the field of vision. Ludewig operated in 32 cases, of which in 21 cases an acute infectious disease was possibly given as cause. The pathological condition of the ossicles was as follows: "The incus alone was carious in 11 cases; the incus together with the malleus in 16 cases; the incus therefore was carious altogether in 27 cases = 84 %." The operation is not without danger. Complete and permanent facial paralysis occurred once, temporary facial paresis twice. There occurred headache in addition in several cases, and vertigo of long duration. The success of malleo-incudal extraction, as observed heretofore in the 32 cases, is as follows: the suppuration is cured in 20 cases, with new formation of the drumhead in 5 cases, without restoration of the membrana tympani in 15 cases; 11 cases are not cured or still under treatment respectively; 1 case died, not owing to the operative procedure. RUMLER.

61. This paper of RANDALL is, in a measure, supplementary to the one published in the Trans. of the Am. Otol. Soc. for this year, some additional cases being given. He considers the affection much commoner than is generally held. He has seen 50 cases in 2,000 ear patients. He gives a *résumé* of the anatomy of the parts involved, and a picture of the clinical aspects. The treatment he recommends is cleanliness and drainage. He thinks that removal of the membrana tympani and ossicles will be necessary only in exceptional instances. SWAN M. BURNETT.

62. In BURNETT'S first case there was a purulent and annoying vertigo and tinnitus accompanying a chronic aural catarrh with an intact sunken membrane. The malleus and the membrana tympani were excised, the tinnitis and vertigo disappeared and have not returned. The second case was one of typical attic disease which had long defied all kinds of treatment. The malleus and the whole of the membrane were excised with a complete relief to the attic disease; the discharge ceased entirely and a new membrane formed from the segment of Rivini down to the promontory. Hearing was slightly improved.

SWAN M. BURNETT.

63. In HEPBURN'S case a hairpin was thrust into the ear, causing severe pain and some hemorrhage. The hearing was very much impaired. On examination the short process was very prominent and the handle apparently twisted with a white line extending across it from below upward and backward near its extremity. Inflation showed this to be a false joint. An opening

in the membrane finally occurred at this point and through it was seen a dislocation of the incudo-stapedial joint. The conditions are figured. Hearing had slightly improved.

SWAN M. BURNETT.

64. BORNBONE distinguishes two forms of purulent tuberculous otitis media chronica. The first form with not extremely marked symptoms, with small perforation and slight secretion, the other in extensive pulmonary infiltration with extremely swollen mucous membrane, extensive destruction of the membrana tympani and profuse secretion. The latter form is quite painful.

STRAZZA (Genua).

65. In this paper LANE points out that the mastoid antrum is usually situated nearer the upper than the posterior surface of the petrous bone ; that the mastoid cells increase in size under the influence of the inflammatory process, and under these conditions, and sometimes normally, communicate with the antrum. Hence the dura mater of the posterior fossa and the lateral sinus are for a considerable area separated from these spaces by only a thin layer of compact bone. Further, the canal for the facial nerve lies to the inner side of the opening of the antrum into the middle ear, so that the former being opened, and a probe passed into the latter, the whole of the bone external to the probe may be gouged away with safety. An interesting case of middle-ear disease is quoted, from which it would appear that Lane looks upon thrombosis in the sinus as a distinctly curative process, to be encouraged by ligature of the internal jugular vein, at the same time taking care to prevent, as far as possible, septic infiltration of the clot by opening up the antrum and cells very freely and establishing free drainage. URBAN PRITCHARD (London).

66. TOTI reports a case of perforation of the suppuration upon the inner surface of the mastoid process (Bezold's disease), and adds some remarks upon the form of the disease.

67. BRAUN adds to the eight successfully operated and permanently cured cases of cerebral abscess from the ear, as reported by VON BERGMANN in his monograph, "Surgical Treatment of Cerebral Disease," two cases taken from literature and one operated on by Schwartze in 1886. Opposite to these cases are seven cases published before, and two from Schwartze's clinic with exitus letalis. Braun is justified in criticising this markedly small number of fatal trephinings as follows : "Many of these cases may not have been published, although just those in which an

autopsy could have been made would be much more instructive than the cured cases." Braun fully analyzes six cases from the clinic at Halle, in which an account of the diagnosis of cerebral abscess and abscess between dura mater and the bone, the trephining was performed. In three of these cases cerebellar abscesses had been present. In the first case, opening of the abscess, cure for three years; in the second case empty abscess cavity found during autopsy; in the third case no abscess was found, cure for one year. In two cases an abscess of the temporal lobe was found and emptied, but death ensued. In one case the pus had all gathered between dura and bone. The patient was cured by trephining. Of the fully reported, interesting histories it may be mentioned, that in one case (cerebellar abscess, cure) the preceding chiselling of the antrum opened the cavity only at the depth of 2.5 *cm*. On account of one case, in which a longish cavity of the size of a plum was found to be without contents, the author discusses the spontaneous cure of cerebral abscesses. Although traces of retrogressive changes of abscesses are found in autopsies, this case is the only one in which, without perforation or emptying by operation, an abscess cavity was found with firm walls, without contents. Braun requires for the trepanation an exact diagnosis. In one case of cerebellar abscess Schwartze opened the skull between the emissarium mastoideam and the protuberantia occipitalis, in the other case 4 *cm* behind the attachment of the auricle. The opening in the bone should be large (3 *ccm*), and the operation performed with the chisel. If the abscess is manifest, the dura should be extensively incised at once. Schwartze then introduced in three cases the aspirating needle, in order to open it extensively after its disclosure. In one case he irrigated the abscess cavity with sublimate (1.1000). The abscess cavity is filled loosely with iodoform gauze after having introduced a wide drainage tube. The dangers of and the objections to the operation are as follows: 1. Difficulty of diagnosis; 2. Infection of the wound, which still frequently occurs in spite of antisepsis; 3. Quality of pus and of the abscess wall. The pus will mostly require irrigations on account of its thick consistence. In case of a thick abscess membrane the extirpation of the entire capsule must be considered according to von Bergmann's method. 4. Soft consistence of the cerebrum and thinness of the abscess wall. Through the latter the perforation of the abscess membrane through the drainage tube took

place in one of Schwartze's cases. 5. Hemorrhage. Injury to the arteria meningea media is of great danger, which then requires circumligation. 6. Prolaps of the cerebrum is always the consequence of increased intracranial pressure. The treatment, apart from the indicatio causalis, that is, the removal of the retention of pus below the prolapse, is simply antiseptic, and in imminent inflammation antiphlogistic. 7. Certain subjective symptoms may remain and epilepsy may follow. Some surgeons neglect the aural affection, which causes the cerebral abscess.

68. RICHARDS gives a long and detailed history of a case of what he considered mastoid abscess, in which the pneumatic and diploëtic structures were converted into dense sclerotic tissue. Unfortunately, no post-mortem examination was made, and the seat of the abscess cannot be definitely stated; but a hole 27 *mm* in depth was drilled into the mastoid. In fact, the author thinks the petrous portion of the temporal bone was invaded, and one of the semicircular canals opened. The author thinks the process started from a middle-ear inflammation, and he at different times removed polypi from what he calls the vault of the tympanum, or *fornix tympani.* He objects to the use of the word "attic" as applied to the space. The patient had several attacks of acute inflammation, which were usually relieved by the application of BACON'S artificial leech. The patient died of diffuse meningitis. SWAN M. BURNETT.

69. POMEROY reports four cases of suppuration of the mastoid, with swelling over that region, in which, on making a Wilde's incision, a fistula was found, opening outwards from the mastoid cavity. These fistulæ were in no single instance enlarged, nor was any diseased bone scraped away. They were treated with iodoform gauze and antiseptic washes. A drainage tube seemed to retard healing. SWAN M. BURNETT.

70. LIPPINCOTT'S patient had had erysipelas of the face and scalp, with the formation of two abscesses. Soon after, pus began to run from the right ear, and some time after there were signs of a mastoidal implication. Pus was found under the periosteum, $\frac{3}{4}$ inch above the upper wall of the meatus, but there was no connection between this and the cavity of the mastoid. The wall of the mastoid was very thin, and on breaking through it a quantity of badly smelling greenish pus was let out. The man made a good recovery. SWAN M. BURNETT.

71. The actual statistics of GREEN'S paper are of 80 cases,

yet his general conclusions are based on about 250 operations. He divides his cases into four classes. I. In which there was no extension of the inflammation into the neighboring parts by œdema, swelling, or redness. II. In which there was an extension outward through the external cortex. III. In which the extension of the inflammation was forward through the anterior wall of the mastoid; and IV. In which the extension was downward through the base of the mastoid. In class I., there were 11 cases; in II., 51; in III., 5, and in IV., 13. Of the 80 patients, 62 were cured, 7 died, and the result in 2 was unknown. In no case does he consider that the operation had an injurious effect upon the hearing. Of the 7 fatal cases, 5 had active brain symptoms at the time of the operation, 1 had bilateral subperiosteal abscesses, and 1 died eleven days after the operation from acute septicæmia. In two cases an autopsy confirmed the diagnosis of meningitis. The two cases in which no pus was found were cases of osteosclerosis. In regard to diagnosis, he regards sensitiveness of the bone on pressure the most important single symptom. Œdema of the external tissues does not indicate pus in the cavity, but only pus on the external surfaces; or it may exist without pus. He has tried all methods of operating, but for the last three years has confined himself to the gouge and mallet for opening the bone, and the dental engine for enlarging the opening and removing irregularities of bone in the interior. He has given up metallic drainage tubes, using only rubber. He has several times exposed the dura and lateral sinus, but with no ill effects.

SWAN M. BURNETT.

72. In the first of TILLEY'S cases the mastoiditis was relieved by rest and attention to the nose and pharynx; in the other three, the features which distinguished them from the ordinary run of such cases were the use of a modified FARRIER'S knife, instead of a chisel or drill, in perforating the mastoid, and in the use of a 3-per-cent. solution of hydrochloric acid for injection. This latter he considers very valuable. SWAN M. BURNETT.

73. SABOURAND demonstrates a specimen of caries of the temporal bone, the patient from whom it was taken having died from a fatal hemorrhage. A lateral pharyngeal abscess had formed with spontaneous perforation, leaving a fistula. On account of symptoms of retention of pus, Dr. Kirnisson, surgeon of the hospital, trephined the skull behind and above the external meatus, and introduced here a drainage tube, curving it into the external

meatus. The child succumbed a few weeks later to a violent hemorrhage, which two days previously was preceded by a hemorrhage, but which was controlled by compression of the carotid. In autopsy the artery was found in the petrous bone to be denuded to an extent of more than 3 *cm* and perforated at one place. There existed three pharyngeal fistulæ. Laterally from the cerebellum a firm tubercle was found which had not produced any symptoms during life. GELLÉ.

74. SCHWARTZE reports from the records of the medical department of the "ministry of war" 28 cases of fatal ear affections. The case of death was in two cases meningitis, in 10 cases cerebral abscesses, in 16 cases thrombosis of the cerebral sinuses, followed by pyæmia. The post-mortem examinations and remarks upon the phenomena during life are communicated and general conclusions are added.

75. In a paper read before the Leeds and West-Riding Medico-Chirurgical Society, Dr. BRONNER gives a very excellent summary of the methods which have been employed at various times to break down adhesions formed between the ossicula of the middle ear. He gives his experience more particularly of the methods of Delstanche and Professor Lucæ, but his results are uncertain, because, as a matter of routine, he appears in nearly all cases to use the catheter, Delstanche's method, and Politzer's bag in succession. If these failed Lucæ's probe was used, and out of 64 cases treated with the latter, improvement was only noted in 20. URBAN PRITCHARD (London).

76. FERRERI has seen 117 cases of polypi of the middle ear. He emphasizes the fact, that he does not think it right to designate the granulations in chronic otorrhœa as polypi, and he distinguishes but two histologically different kinds of polypi: (1) fibrous with the structure of small fibromata; (2) myxomatous polypi. The latter are according to Ferreri more numerous. Four illustrations. STRAZZA.

77. The sarcoma reported by HAUG had started from the tympanic cavity. Rapid growth led to death after eleven months under the appearances of facial paralysis and meningitis. RUMLER.

78. On account of KIESSELBACHS' recommendation, SCHWABACH used in ear noises cocaine for injection into the tympanic cavity *per tubam*. In one case, in which he had injected five drops of a five-per-cent. solution, violent symptoms of intoxica-

tion appeared after the course of about a quarter of an hour. The author advises, therefore, to begin always with very small doses and to retain the patient in the office at least half an hour after the application.

79. BAUMGARTEN confirms Kiesselbach's observation of the beneficial results from the use of cocaine in tinnitus, which, however, is observed only in some persons and then only at certain periods. Tinnitus in affections of the labyrinth, hysterical and nervous noises (when no catarrh is present), rarer anæmic may be relieved. Five per cent. solution of cocaine acts also when injected through the catheter against tinnitus in otitis med. chronica, but never in marked sclerosis and quinine deafness. Baumgarten recommends cotton pellets imbued with a five- to ten-per-cent. solution of cocaine; the hearing improves then, and they are well borne, when other applications produce suppuration. In one case he observed an excellent result after occluding a perforation with a small cocaine-cotton pellet. The action of the cocaine depends upon the contraction of the vessels and of the swollen mucous membrane, whereupon the ossicles vibrate more readily. In acute inflammations and nervous persons slight phenomena of intoxication are frequently observed when cocaine is used in the ear. KILLIAN.

NERVOUS APPARATUS.

80. GRADENIGO, Turin. The anatomical changes of the hearing organs in intra-cranial diseases, especially in the different forms of meningitis.

80. GRADENIGO reports the microscopical and macroscopical examination of the hearing organs of persons who died under meningitic symptoms. 1. Three cases of tuberculous meningitis. 2. One case of purulent meningitis. 3. Two cases of meningitis cerebrospinalis epidemica. 4. Two cases of cerebral tumors and one with apoplectic extravasation. Grandenigo arrives at the following conclusions: 1. In meningitis the inflammation implicates almost invariably the fibres of the acoustic and facial nerves. The inflammation which extends to the ganglion geniculatum of the facial does not attack its histological structure, while the acoustic is injured at the end of the porus acusticus internus, where the nerve branches. 2. In the intracranial affections lymphatic congestions frequently take place, which increase the electric irritability of the acoustic nerve. STRAZZA.

NOSE AND NASO-PHARYNX.

81. KAFEMANN, R., Koenigsberg. School examinations of the nose and naso-pharynx of 2,238 children, with especial reference to the tonsilla pharyngea and aprosexia nasalis.

82. FLATAU, THEODOR, Berlin. Laryngoscopy and rhinoscopy, including general diagnosis and therapeutics. Berlin, 1890.

83. KAUFMANN, E., Prague. A typical form of tumor of the mucous membrane (lateral ridge of the mucous membrane) at the external nasal wall. *Monatsschr. f. Ohrenheilk.*, etc.

84. HAJEK, M., Vienna. The perforating ulcer of the nasal septum. *Virch. Arch. f. Pathol. Anat.*, vol. cxx., No. 3.

85. MICHELSON, P., Koenigsberg. Tuberculosis of the nasal and oral mucous membrane. *Zeitsehr. f. Klin. Med.*, vol. xvii., supplem. vol.

86. PATRZEK. Deviations of the nasal septum. *Verein der Aerzte Oberschlesiens at Oppeln.* May 1, 1890.

87. PATRZEK. Deviation of the nasal septum in the newborn. *Internat. klin. Rundschau*, 1890, No. 14.

88. ZIEM, Danzig. Curvature of the spinal column with obstructing nasal affections. *Monatsschr. f. Ohrenheilk.* 1890. No. 5.

89. KAFEMANN, R., Koenigsberg. A frequent indication for the use of electrolysis in the nose. *Therapeutische Monatshefte*, 1890, No. 3.

90. SEIFERT, Würzburg. Aristol. *Wiener klin. Wochenschr.*, 1890, No. 18.

91. LOEWENSTEIN. Aristol for treatment of ozæna simplex. *Internat. klin. Rundschau*, 1890, No. 20.

92. MEYJES, W., POSTHUMUS, Amsterdam. Treatment of ozæna. *Monatschr. f. Ohrenheilk.*, 1890, No. 6.

93. TREITEL, Berlin. Reactive phenomena after operations in the nose. *Berliner klin. Wochenschr.*, 1890, No. 16.

94. NOLTENNIS, Bremen. Brushing off nasal polypi, and other applications of the nasal brush. *Terapeutische Monatsh.*, 1890, No. 3.

95. NOLTENNIS. The styptic action of Penghawar Djambie. *Ibidem.*

96. CHEVALLET, E. Treatment of nasal fractures with the

plaster-of-Paris apparatus. (Traitement des fractures du nez par l'appareil plâtré. *Thèse de Lyon*, 1889.

97. BLOCH, CALMAN. Empyema of Highmor's antrum, etc. Dissertation. Koenigsberg, 1890.

98. SCHMIDT, CARL, Odessa. On the treatment of empyema in cavities with osseous walls. *Berliner klin. Wochenschr.*, 1890, No. 7.

99. HALLEIS. Mucocele and empyema of Highmors' antrum and the frontal sinus. *Med.-Chir. Centralbl.*, 1890, Nos. 18 and 19.

100. HANSBERG, Dortmund. Probing the accessory cavities of the nose. *Monatsschr. f. Ohrenheilk.*, 1890, Nos. 1 and 2.

101. BRONNER, ADOLF. On some relations between the diseases of the nose and the eye. *The Journal of Laryngology and Rhinology*, December, 1889.

102. LICHTWITZ, L., Bordeaux. Contributions to the study of nasal and pharyngeal reflex neuroses. *Prager med. Wochenschr.*, 1890, No. 6.

103. BUCK, A. H. On the renewed employment of the nasal douche and kindred procedures. *Trans. Amer. Otol. Soc.*, 1890.

104. EHRMANN, F., New York. The employment of acidum trichloraceticum in nasal and pharyngeal diseases. *Münch. med. Wochenschr.*

105. HEWITT, FRED. Anæsthetics in naso-pharyngeal operations. *Bost. Med. Jour.*, Oct. 5, 1890.

106. ROHRER, Zurich. Case of rhinolithiasis. *Wiener klin. Wochenschr.*, 1890, No. 2.

107. RUAULT, Paris. Four cases of rhinolithiasis (quatre cas de rhinolithiase). *Soc. fr. d'olol.*, May 10th, 1890.

108. KAFEMANN, R., Koenigsberg. Anatomical and therapeutical remarks on the fornix pharyngis. *Monatsschr. f. Ohrenheilk.*, 1890, No. 3.

109. BRONNER, ADOLF. On some affections of the bursa pharyngea. *The Lancet*, January 11th, 1890.

110. GERBER, P., Koenigsberg. Retro-nasal catarrh and its treatment, with especial reference to Tornwaldt's disease. *Therapeutische Monatshefte*, 1890, No. 1.

111. ZIEM, Danzig. Remarks upon Dr. Gerber's paper on retro-nasal catarrh and the so-called Tornwaldt's disease. *Therapeutische Monatshefte*, No. 4.

112. CARTAZ, Paris. Complications following the removal of adenoid vegetations (complications consécutives à l'ablation de végétations adenoides). *Soc. fr. d'otol.*, May 10th, 1890.

113. FELICI, FRANCESCO, Rome. Rapid removal of a naso-pharyngeal fibroma (exportazione rapida di un fibroma naso-faringeo). *Arch. Italiani Laringologia*, Anno x., No. 3.

114. UCHERMANN, Christiania. Naso-pharyngeal fibroma removed with the galvano-cautery. *Norsk. Magaz. f. Leegevid.*, 1890, No. 6.

115. KRONACHER, Munich. Contribution of clinical cases of primary epithelial carcinoma of the hard palate. *Deutsche Zeitschr. f. Chir.*, vol. xxix., Nos. 2 and 3, p. 193.

81. KAFEMANN considers that latent naso-pharyngeal affections are frequently the cause of defective development of the body and mind. In consequence of the great indolence of the lower classes in naso-pharyngeal affections a great number of children are taken to schools for the weak-minded, which could be frequently avoided under early and appropriate treatment. Owing to these considerations, Kafemann examined 2,238 children in public schools and found hypertrophy of the pharyngeal tonsil in 7.6 per cent. of the boys and 10.6 per cent. of the girls. The oral tonsil was found to be enlarged 131 times in boys and 150 times in girls. In 22.4 per cent. of these the pharyngeal tonsil also was found to be hypertrophic. In boys the pharyngeal mucous membrane was granulated in 36.3 per cent. of all examined children, in the girls in 17.4 per cent. only. Considerable deviations of the cartilaginous nasal septum, eventually requiring surgical interference, were found 84 times in the boys and 50 times in the girls. Marked hypertrophy of the turbinated bodies, and exclusively of the lower ones, occurred 68 times in the boys. Kafemann has not observed any mucous polypi. Ozæna was found 10 times in the boys and 29 times in the girls. In the school for weak-minded children, Kafemann found in 15 boys, examined rhinoscopically, five times extreme hypertrophy of the pharyngeal tonsil, with disturbances of speech, the ear, etc. The author believes that early treatment could have extremely benefited these children.

JENS.

82. FLATAU'S monograph is an introduction to laryngoscopy and rhinoscopy adapted to the requirements of the practitioner. The final chapter gives therapeutic indications.

83. KAUFMANN has tabulated thirty-seven cases, in which the lateral ridge of the mucous membrane — that is, hypertrophy of the lower margin of the hiatus semilunaris—was present, which has been first described anatomically by Zuckerkandl, and first observed clinically by Hartmann. In nineteen of these cases there existed empyema of the antrum and nasal polypi, in nine empyema only, and in eight ozæna simplex. The ridge is caused, according to Kaufmann, only by purulent catarrh of Highmor's antrum; its presence, therefore, proves inversely that empyema of the antrum is or has been present. The author considers as consequences of the formation of the ridge: obstruction of nasal respiration, occlusion of the "smelling cleft" with temporary or permanent loss of the sensation of smell, abolition of ventilation of the accessory cavities, permanence and uncurability of suppuration of Highmor's antrum, continuous relapses of nasal polypi, pushing aside and atrophy of the middle turbinated body, and furtherance of development of ozæna from empyema of the antrum. For the cure of suppurations of the antrum (with irrigations through existing or artificial openings) and of accessory nasal polypi, Kaufmann considers the removal of the ridge (with knife and snare) as essentially necessary, because it hinders the natural efflux of the pus, and hides the masses of granulations and polypi, which become easy of access for the surgeon after its removal. The bilateral existence of the ridge in nine cases of ozæna points to suppuration of the antrum. KILLIAN.

84. HAJEK arrives from his elaborate examinations at the following views: The perforating ulcus is, according to anatomical and clinical observations, a progressive necrosis of the mucous membrane and cartilage within the cartilaginous nasal septum, which frequently begins with hemorrhage in the mucous membrane and takes a chronic course, leading, without considerable changes in the surrounding mucous membrane, to perforation of the nasal septum (but is rarely cured before) and to spontaneous recovery after perforation. As a result of the ulceration, there remains a circular defect, with sharply defined, smooth edges. The process of ulceration is in no way connected with syphilis.

85. The tuberculosis of the oral mucous membrane (eight cases) invariably occurred in consequence of ulcerations, at times with masses of raspberry formation. The prognosis depends principally upon the intensity of the infection. Some cases recover under treatment with indifferent remedies, others defy

the most radical measures. One should, therefore, not overtax the curative action of certain remedies. The author praises menthol oil as an excellent analgetic only, which is preferable to cocaine and morphia on account of its lack of poisonousness. An unfavorable prognosis is offered by tuberculous angina (four cases). Weakening treatment exerts an extremely injurious influence upon the course of the disease. He warns, therefore, most urgently against mistaking the tuberculous for syphilitic affections. ZARNIKO.

86 and 87. PATRZEK'S first paper gives a general description of the conditions concerning the deviations of the septum. In the second paper Patrzek proves that deviations may also occur in the new-born while, as it has been heretofore supposed, the deviations of the nasal septum develop at the period of second dentition. Patrzek has three autopsies in children for this condition, making frontal sections through the nasal cavity. In Case 1 the septum is normal; in the other two cases it is deviated to the left side. Patrzek does not believe that these deviations have developed on account of anomalies during birth, but that they originate from an intra-uterine period.

88. ZIEM has proven before that in nasal affections asymmetry of the skull may take place. The consequence may be a curvature of the spinal column. LESSHAFT has produced scoliosis in dogs and rabbits by placing small weights upon one side of the head. Ziem observed that a boy, æt. four and a half, with congenital unilateral hypertrophy of the face, used to incline toward the opposite side. Since the head of the adult amounts to $\frac{1}{17}$ to $\frac{1}{11}$ (BRAUNE) and that of the new-born $\frac{1}{25}$ (VALENTIN) of the total weight of the body, it can be imagined that overweighting of one side of the head in early age may produce scoliosis. SCHECH speaks of scoliosis of the cervical spinal column only in consequence of early nasal obstruction. Ziem, however, has observed numerous cases of asymmetry of the entire spinal column in traumatic deviation of the septum and of the external nose or in stenosis of one nostril of long duration. In a very young rabbit, of which one nostril was freshened and sewed together, Ziem found after eight weeks the cervical spinal column and the sternum to be curved, the left half of the thorax flattened; and in a second rabbit treated in the same manner, the cervical spinal column turned around a sagittal axis and the lumbar spinal column showed a lordotic curvature. KILLIAN.

89. KAFEMANN has observed in three cases of galvano-caustic treatment of nests of nasal polypi adhesion between septum and turbinated body; he therefore urgently recommends the use of electrolysis. JENS.

90. SEIFERT among other cases has treated some nasal affections with aristol. Lupus was rapidly cured in one case, but not in others. A case of extensive nasal and pharangeal spyhilis was almost completely cured after treatment of twelve days' duration, but it is true that it was simultaneously treated with small doses of iodide of potassium. Repeated trials and careful examinations of the urine, for the presence of iodine, set free from the aristol, had a negative result. NOLTENNIS.

91. LOEWENSTEIN has used aristol in three cases of genuine and in one case of "syphilitic" ozæna, and he considers it superior to any of the host of remedies which have been recommended against ozæna. This remedy also can, according to the author, only mask the trouble, not cure it. NOLTENNIS.

92. MEYJES first plugs for twenty to thirty minutes, and then dries. He then sprays twelve drops of a 2-per-cent. solution of nitrate of silver into the cavity. Daily repetition of this procedure, with gradually stronger solutions (up to 25 per cent. after a week). He stops at 25 per cent., and instils more rarely, when improvement is observed. He has better results in this manner in days than with other remedies in weeks. KILLIAN.

93. Intense and alarming reactive symptoms have heretofore not been observed at the policlinic of the university of Berlin for throat and nose patients after operations on the nose. Slight general disturbances frequently occurred. TREITEL draws special attention to the not unfrequently occurring angina. He thinks this angina lacunaris has to be considered as an accidental complication in such a way that "the operation causes hyperæmia of the nasal and adjoining mucous membranes, which dispose to the infection with the veins." The lymph apparatus does not play an essential part in this process. Treitel has frequently observed reactions from the nervous system as follows: Neuralgia, in some cases also physical depression. It is therefore advisable to recommend care for some days to the operated persons. RUMLER.

94. MICHELSON uses special brushes to brush forward nasal polypi which are situated in the posterior portion of the nose. The brushes are left inside, whereby the removal of the polypi is facilitated.

95. Under the name of Penghawar Djambi the chaffy hairs of tree-like ferns growing in Java and Sumatra are sold. The specimen is most appropriately mixed, according to Noltennis, with ordinary cotton, because it readily puverizes when used pure. In consequence of the great elasticity and the slight faculty of imbibition of the drug, no after-bleeding takes place when the plug is properly introduced. The above-mentioned mixture is sold under the name of Penghawar-cotton.

96. CHEVALLET divides the fractures of the nose into three classes: 1. Fractures of the bone proper. 2. Luxations of the bones proper, mixed with the fractures, which are from time to time denied and asserted. 3. Fractures and luxations of the cartilaginous partition wall upon the vomer; they can be experimentally produced by splitting the cartilaginous partition wall. A continuous depression is then observed which extends from the bone proper to the nasal tip. The author rejects every inner supporting apparatus as useless. He recommends an apparatus of plaster-of-Paris, against which the luxated portions are pressed.

GELLÉ.

97. BLOCH's dissertation is based upon 26 cases of empyema of the autrum which has been treated in Michelson's policlinic. The treatise contains a full discussion of all conditions pertaining to the subject. MIKULICZ's method (penetration from the lower nasal meatus) is recommended for treatment. Of 22 operated cases 13 were cured, 4 improved and still under treatment, 4 not cured, and in 1 the exitus is unknown.

98. SCHMIDT reports the histories of three cases of empyema of the antrum, which have been cured with Hartmann's method (irrigation from the middle nasal meatus).

99. This paper contains a synopsis of the most important relations to the diagnosis and treatment of the affection mentioned in the heading. The author's own observations complete the whole. He recommends the operation by means of WHITE's drill engine (Ziem). With regard to the diagnosis the author, according to my opinion, undervalues the usefulness of the exploratory puncture by means of suitably curved and strong PRAVAZ syringes (Michelson). The trephining of the frontal sinus does not need to be left to the surgeon, as the author believes. NOLTENNIS.

100. HANSBERG, in sagittal sections made from eighty autopsies of adults, has examined the relations of the entrance of the maxillar frontal and sphenoidal cavities. He found the hiatus semilunaris to be 24 *mm* long on the average and of quite varying width (up to

10 *mm*). The latter is essentially influenced by the bulla ethmoidalis which may be so large as to appear like a middle concha. The processus uncinatus was frequently turned quite inward or it was turned into a large osseous bulla. The situation and form of the middle turbinated body and the width of the middle nasal meatus varied greatly, and in one case facilitated probing or made it difficult in another. Accessory openings were found in every sixth or seventh case. Hansberg used for probing the anteriorly curved myrtle-leaf probe and reached in two thirds of his cases the antrum or at least the hiatus (apart from ozænas). The possibility of introducing a probe or canula respectively is, according to Hansberg, of decisive diagnostic importance and permits effective treatment without artificial opening of the antrum. If the result of irrigation is negative the patient is spared an exploratory puncture. The frequency of empyema seems, according to Hansberg, to be due less to the relations of the maxillary cavity to the dental roots, than to the frequent convenient entrance through the ostium or foramen secundarium for infecting agents from the nasal cavity, principally in purulent catarrh of the mucous membrane. Hansberg found only in one case the dental root to be prominent in the antrum. One specimen exhibited with total absence of the teeth a bilateral empyema. The floor of the maxillar cavity was on the left side 2 *cm* distant from the alveolar margin, the mucous membrane was more extremely swollen than on the other side, and an accessory opening was simultaneously found. Opening of the antrum from the fossa canina or from the alveolar process would have been very difficult in this case, and probably impossible from the lower nasal meatus. Hansberg, with regard to the frontal sinus, considers JURASZ'S view as peculiar that probing was possible only when the point of exit of the frontal cavity could be seen ; for in none of his numerous specimens could this place be seen, because it was invariably covered by the middle turbinated body (excluding the cases of ozœna and lues). In spite of this fact he has succeeded in probing half of the cases ; in the other half he was hindered by the middle turbinated body, the anterior end of which had under these circumstances to be previously removed, when the probing in the living appeared to be desirable. The frontal sinus entered in Hansberg's cases not always into the hiatus, but in some cases anteriorly into the middle nasal meatus ; two ostia were frequently, three rarely present. The canal running from the entrance to the

frontal cavity proper was mostly 12 *mm*, at times up to 20 *mm*, long, and was permeable for a probe of ½ to 1 *mm* in thickness. The sphenoidal cavity could be probed in two thirds of the cases. The possibility of probing depends upon the width of the distance between middle turbinated body and septum. KILLIAN.

101. BRONNER reviews the experiences concerning the connection between affections of the eye and nose. Nasal affections may produce: lachrymation, dacryocystitis, conjunctivitis, muscular asthenopia, scotoma, amblyopia, glaucoma and orbital abscesses.

102. LICHTWITZ gives the histories of fives cases in which neuroses were cured by local treatment of affections of the nose and pharynx. Then follows a discussion of the different theories for the establishment of such reflex neuroses. He distinguishes two categories of the latter, which are also of different practical importance. 1. Reflex neuroses in a limited sense, caused by lesions of the nasal and pharyngeal mucous membrane. 2. Neuroses of central origin, in which a simultaneous affection of the nose and pharynx is present. KLINGEL.

103. BUCK reiterates the warning against the employment of the nasal douche in the treatment of nasal affections which he thinks is again coming into vogue from the increased number of cases of middle-ear inflammation which have been recently referable to that cause. He recommends the use of a spray, not as a measure of primary consideration, but of secondary value after the local application of solutions of nitrate of silver.

SWAN M. BURNETT.

104. EHRMANN has tried the therapeutic action of trichloracetic acid. It produces, applied to a mucous membrane, a dry, ivory-white, smooth eschar without any inflammatory reaction, which becomes detached mostly after two to six days. The author emphasizes the beneficial effect of trichloracetic acid against that of chromic acid. It has no astringent action. KLINGEL.

105. HEWITT recommends that in the removal of post-nasal growths the best anæsthetic to employ is nitrous oxide with a small quantity of ether, and, as far as position is concerned, he speaks strongly in favor of Woodhouse Braine's method of raising the patient to a sitting position, opening the mouth with a gag, and bending the head well forward over a basin. In the removal of tonsils Hewitt recommends the alcohol chloroform-ether mixture. URBAN PRITCHARD (London.)

106. ROHRER gives the illustration of a large rhinolith, which was extracted from the left nostril of a woman, forty-eight years old, with quite considerable force, and after breaking off the peculiarly formed processes. The simultaneous aural affection (sclerosis) was considerably improved. NOLTENNIS.

107. RUAULT has observed among 3000 patients four cases of rhinoliths.

108. KAFEMANN'S paper has been reviewed in these ARCHIVES in the anatomical part of this report, on page 167 of this volume.

109. BRONNER reports four cases of bursitis pharyngea. He recommends the use of a curette, which is somewhat narrower than Hartmann's.

110. GERBER arrives, from an examination of 61 cases of naso-pharyngeal catarrh, at the following views: 1. Many symptoms, the causes of which were formerly not looked for in the nose and pharynx, are but partial phenomena of the retro-nasal catarrh, which is one of the most frequent affections of the upper respiratory tracts. 2. The diagnosis of retro-nasal catarrh can be made positively only by pharyngo-rhinoscopical examination. 3. In the affection are implicated either: *a*, the entire mucous membrane of the pharynx equally; or *b*, principally isolated fissures of the mucous membrane of the fornix pharyngis; *c*, principally the middle tonsillar fissure, which is mostly the deepest. 4. Rosenmüller's fossæ also may serve to retain secretions to a great extent, especially if the folds of the mucous membrane are divided into rows. 5. There are cases of atrophic catarrh, exclusively localized at the fornix pharyngis, in which a moderate fetor or ore usually exists. 6. It is important for the treatment to learn the origin of the discharge. JENS.

111. ZIEM opposes these assertions, remarking that Gerber had not succeeded in proving that in his cases the suppuration had not originated in the nose.

112. CARTAZ reports violent hemorrhage after the removal of adenoid vegetations. The treatment consists of hot astringent injections. In severe cases plugging is necessary. In order to prevent infections the instruments should be made aseptic with great care.

113. FELICI reports a large pedunculated fibroma of the naso-pharynx, which was removed with the galvano-cautery snare.

114. At the meeting of the Christiania Medical Society, on May 21, 1890, UCHERMANN presented a patient, whom he had

operated for a naso-pharyngeal fibroma with the galvano-cautery knife. The patient, a merchant, twenty-six years old, had for the last ten years suffered from violent epistaxis. At such an occurrence the nose had been split at the hospital and a portion of the tumor removed without permanent recovery. At the beginning of the year the entire naso-pharynx was filled with a reddish-white, quite smooth, very hard tumor, which originated from the fornix pharyngis backward and upward, with a broad base, and gave off two branches into both nostrils. These filled the posterior portion of the nasal cavities entirely, and were partially adhesive to the velum and the lateral walls of the nose. These branches were severed in several sittings with the galvano-cautery knife without hemorrhage, whereupon the different portions were removed from the nose and pharynx with the galvano-cautery burner and snare. The speaker emphasizes the great advantages of this method of treatment over the former with the knife.

AUTOREVIEW.

115. A private gentleman, whose age was not stated, exhibited the very rare affection, which had existed at the time of the first observation for three years, viz., a carcinoma, probably due to mechanical irritation of the inflammatory base from a harmless dental abscess. The course was remarkable for the development of leukoplakia seu psoriasis from the very first beginning. Billroth among others has long pointed out the unfavorable prognostic importance of these epithelial proliferations as precursors of relapses of carcinoma. Although the disease lasts three years with comparative good health, the prognosis, according to Kronacher, is utterly unfavorable with regard to recovery on account of the implicated lymphoid glands and the epithelial proliferation in the surroundings of the fistula. MOOS.

ENGLISH NOTES.

A.—MEETINGS OF SOCIETIES.

Leeds and West Riding Medico-Chirurgical Society.—At a pathological meeting of this society on February 20th, Dr. Bronner showed (1) a series of post-nasal growths removed by Hartmann's curette, illustrating the different forms of hypertrophy of the pharyngeal tonsil and the formation of the so-called Tornwald's bursæ; (2) fibro-mucous polypi of the naso-pharynx; (3) portions of the inferior turbinated bones, removed by means of the dental trephine; (4) caries of the "attic," giving rise to cerebral abscess; (5) caries of the "attic" and upper cells of the mastoid, giving rise to phlebitis of the lateral sinus.

At a meeting of the same society on April 3d, Dr. Bronner read a paper upon the use of "The Eustachian Catheter in Disease of the Middle Ear."

At the meeting held on April 17th, the same gentleman showed specimens of diseased incus and malleus from a case of chronic otorrhœa. The malleus had been removed by means of a wire hook. Mr. Littlewood exhibited microscopic sections of a growth which had been found attached to the posterior extremity of the inferior turbinated bone.

Royal Academy of Medicine in Ireland.—At a meeting of the Section of Anatomy and Physiology held on March 20, 1891, Dr. W. H. Thompson showed a skull and specimens illustrating the anatomy of the middle and internal ears, and remarked upon the inaccurate descriptions usually found in text-books.

Royal Society of Edinburgh.—At the fifth meeting, held on February 2, 1891, Professor Rutherford read an interesting paper on "The Organ of Hearing," an abstract of which we hope shortly to be able to present to our readers.

CLINICAL SOCIETY OF LONDON.—At a recent meeting (May 8th) Mr. Stephen Paget described a case of cerebral abscess in which he had trephined the skull, a second trephining becoming necessary at a lower level after the lapse of eleven days. Mr. Paget drew attention to the voracious appetite which in this, as in five other recorded cases, had been such a prominent symptom. The patient made a very satisfactory recovery.

PATHOLOGICAL SOCIETY OF LONDON.—At the meeting on May 19th, Mr. Ballance exhibited a remarkably large exostosis that he had removed from the meatus of a young woman of twenty-four. The growth measured fully three quarters of an inch in diameter.

BRITISH MEDICAL ASSOCIATION.—The fifty-ninth annual meeting will be held at Bournemouth on Tuesday, Wednesday, Thursday, and Friday, July 28th, 29th, 30th, and 31st. President, Willoughby Francis Wade, B.A., M.B., F.R.C.P., I.P., Senior Physician, Birmingham General Hospital. President-Elect, John Robert Thomson, M.D., F.R.C.P., Consulting Physician, Sussex County Hospital.

APPOINTMENTS.

ALEX. BLACK, M.B., F.R.C.P. (Edinburgh), has been appointed Surgeon to the Eye, Ear, and Throat Infirmary, Edinburgh, *vice* Ross resigned.

A. I. BRADY, L.R.C.S., etc., has been reappointed Honorary Senior Aural Surgeon to the Sydney Hospital, New South Wales.

ADOLF BRONNER, M.D., has been appointed Honorary Laryngologist to the Bradford Infirmary.

Dr. I. K. LOVE has been appointed Aurist to the Deaf and Dumb Institution, Langside, Glasgow.

ARTHUR SANDFORD, M.D., M.Ch., has been appointed Lecturer upon Ophthalmology and Otology in Queen's College, Cork.

W. C. WILKINSON, M.B., etc., has been reappointed Honorary Assistant Aural Surgeon to the Sydney Hospital, New South Wales.

BEQUESTS.

By the will of the late Mr. W. Cramond, a manufacturer of Derby, the Derby Deaf and Dumb Institution obtains a legacy of £500.

The late Mrs. M. F. Burgess has, by her will, left the sum of £100 to the Eye and Ear Institution of Birkenhead.

Mr. Thomas Walker, of Doncaster, has bequeathed £500 to the Yorkshire Deaf and Dumb Institution.

B.—MISCELLANEOUS.

In the Post-Graduate Course at the London Throat Hospital on March 9, 1891, Mr. Mark Hovell lectured upon "Chronic Suppurative Inflammation of the Middle Ear and its Treatment."

In the *British Medical Journal* of March 21st, Dr. Bell, of Warrenpoint, County Down, records an interesting case in which a pea was removed from the external meatus, where there is every reason to believe it had been lodged for upwards of thirteen years.

There is undoubtedly, just at present, a tendency to overestimate the importance of nasal disease as an exciting cause of aural troubles. Mr. Marmaduke Sheild's advice to the students of Charing Cross Hospital in this matter is well worth bearing in mind. Mr. Sheild concludes a clinical lecture upon the subject, with a plea for "accuracy in diagnosis, care in selection, and a distinct and rational belief that the patient will receive benefit from the operative procedures adopted."

"Bubble Remedies in Aural Surgery."—Under this title Sir William Dalby, in the *Lancet* of April 11th, passes in review certain methods of treatment, each of which has at one time or another been vaunted as the almost universal panacea for nearly every conceivable form of ear disease.

As Sir William Dalby points out, such remedies have usually their legitimate use, although their sphere of action is much more limited than the modern Cagliostros would have us believe, and it is their abuse, rather than their use, against which such an earnest protest is raised.

The credulity of people in general, and, it would almost appear, of deaf people in particular, seems to be unbounded. It only needed, for instance, some slight encouragement in certain quarters to induce a bold speculator to endeavor to float a company, with a capital of £10,000, for the manufactured sale of ear-drums ! !

With regard to electricity, aural surgery probably suffers no more from this craze than do other departments of the healing

art. The production, and more especially the application, of this peculiar agent is involved in so much mystery, and the results which at times follow its use are so totally unexpected, that we cannot be surprised that it has charms for the lay mind.

In respect to the pilocarpin cure, we are reminded by the writer that even Politzer himself, the originator of the idea, has found it necessary to issue a strong protest and warning against its indiscriminate use.

But what will probably strike the reader of the article with greater force than anything, is the boldness with which Sir William Dalby unhesitatingly condemns useless and irrational surgical interference. Under this head he speaks of removal of the middle turbinated bone for deafness as a surgical procedure, —outside the pale of serious discussion, and he is equally outspoken in his remarks upon such other operations as division of the tensor tympani muscles, etc.

The paper, as a whole, is certainly a remarkable one, and will amply repay perusal. Conceived in a spirit of cynicism, its literary style is excellent, while it possesses still stronger claims for commendation on account of the valuable lessons inculcated "between the lines."

An Unusual Symptom in Middle-Ear Disease.—In the *Lancet* for May 16th, Mr. R. Lake records a case in which, after removal of post-nasal growths in a female æt. twenty-one, inflation of the middle ear by Valsalva's method, was accompanied by a report so loud as to be audible to the surgeon standing on the other side of the room.

London Post-Graduate Course.—On Thursday, June 4th, Mr. R. H. Stewart lectured at the London Throat Hospital on "Some of the Causes of Ear Disease."

AMERICAN NOTE.

Dr. A. G. Sinclair, Professor of Ophthalmology, Otology, and Laryngology in the Memphis Hospital Medical College, has been appointed Surgeon-in-Charge of the Eye and Ear Department of St. Joseph's Hospital in that city.